The Electrical Industry's Weekly Magazine November 6, 1961

Electrical World

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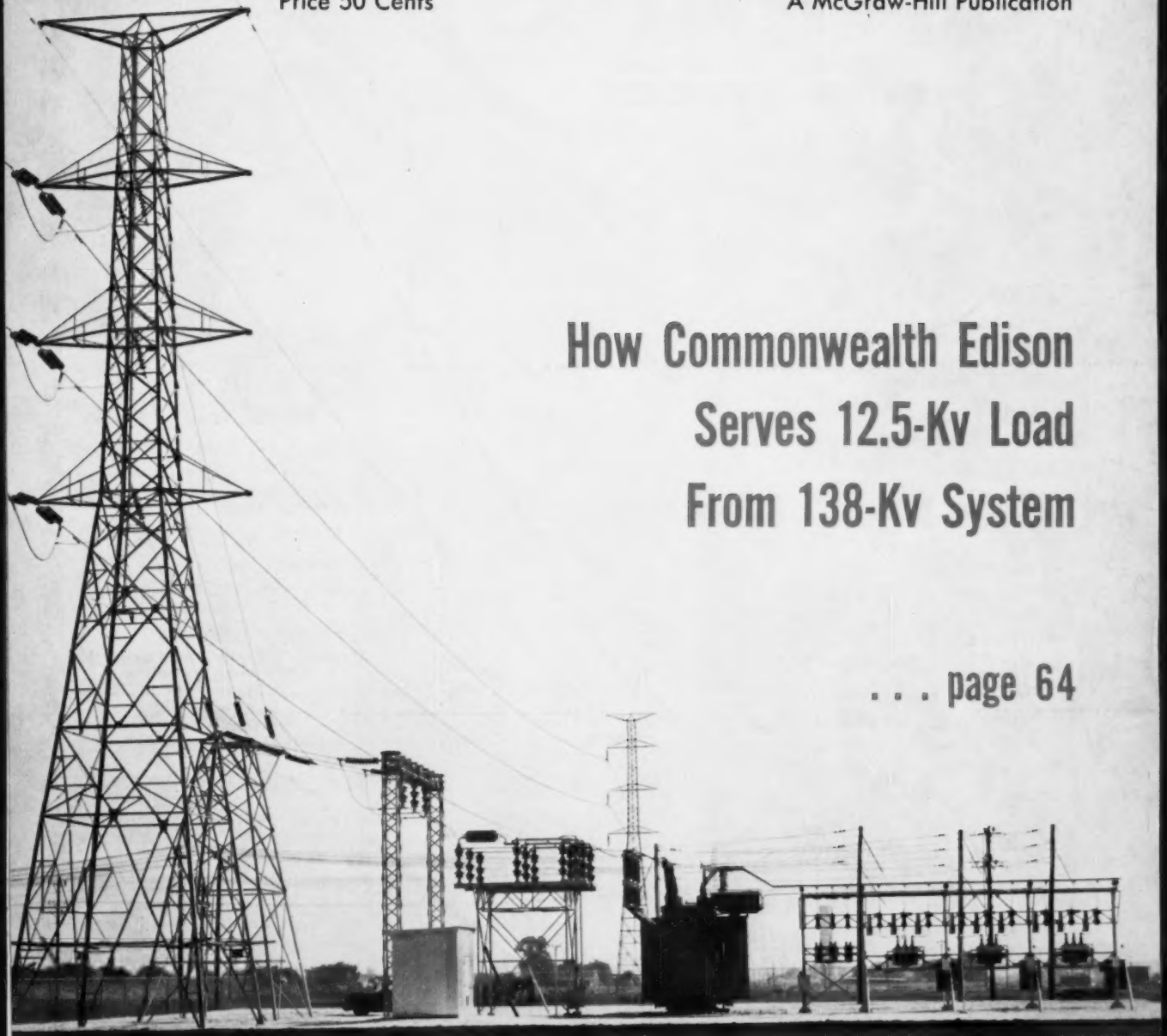

How Commonwealth Edison Serves 12.5-Kv Load From 138-Kv System

. . . page 64

UNIV MICROFILMS INC
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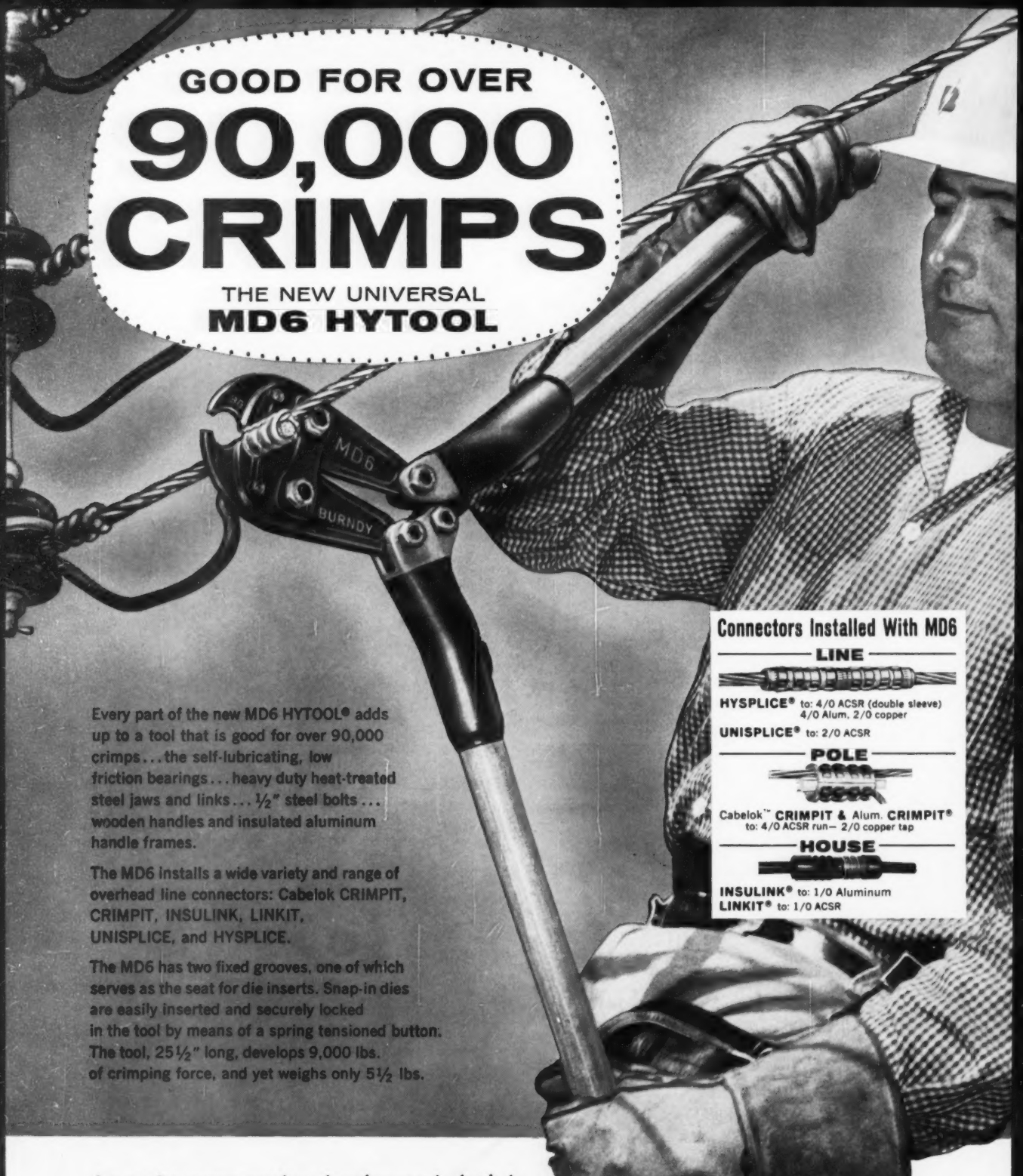

Every part of the new MD6 HYTOOL® adds up to a tool that is good for over 90,000 crimps... the self-lubricating, low friction bearings... heavy duty heat-treated steel jaws and links... ½" steel bolts... wooden handles and insulated aluminum handle frames.

The MD6 installs a wide variety and range of overhead line connectors: Cabelok CRIMPIT, CRIMPIT, INSULINK, LINKIT, UNISPLICE, and HYSPLICE.

The MD6 has two fixed grooves, one of which serves as the seat for die inserts. Snap-in dies are easily inserted and securely locked in the tool by means of a spring tensioned button. The tool, 25½" long, develops 9,000 lbs. of crimping force, and yet weighs only 5½ lbs.

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LINE

HYSPLICE® to: 4/0 ACSR (double sleeve) 4/0 Alum, 2/0 copper

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POLE

Cabelok™ **CRIMPIT &** Alum. **CRIMPIT®** to: 4/0 ACSR run— 2/0 copper tap

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INSULINK® to: 1/0 Aluminum
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Published for 87 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Electrical World

November 6, 1961
Vol. 156, No. 19

Dateline . . .

Views Divided on Direct Sale of Uranium

Germantown, Md.—There is a real possibility that the Atomic Energy Commission will recommend and Congress will accept a switch from present leasing of nuclear reactor fuels by the government to outright sales of nuclear fuels to utilities.

The move toward outright sales is being argued by the commission staff. Responsible and experienced AEC experts working on the civilian nuclear power program are worried. They fear that abandonment of present leasing arrangements will kill all future construction of power reactors. They feel, moreover, that the drive to replace leasing arrangements with direct sales comes at a particularly unfortunate time—just about when economic nuclear power had been won. The nation has come a mighty long way toward realizing its goals, these experts argue, and they hate to see the march halted.

Others on the commission staff don't think the situation is as grave as portrayed by the civilian reactor group. This group sees advantages to the government in permitting private ownership of reactor fuels. They say direct sales would save the government the expense of building up costly fuel inventories and would remove "built-in subsidies" reflected by AEC's current use charges. Commissioner Robert S. Wilson leads the group which favors direct sales.

The private utility and reactor manufacturing industries have been slow to react with an over-all position on a change from AEC to private ownership of fuels. Preliminary suggestions coming from the Edison Electric Institute and Atomic Industrial Forum favor private ownership—in principle—but

(*Continued on page 5*)

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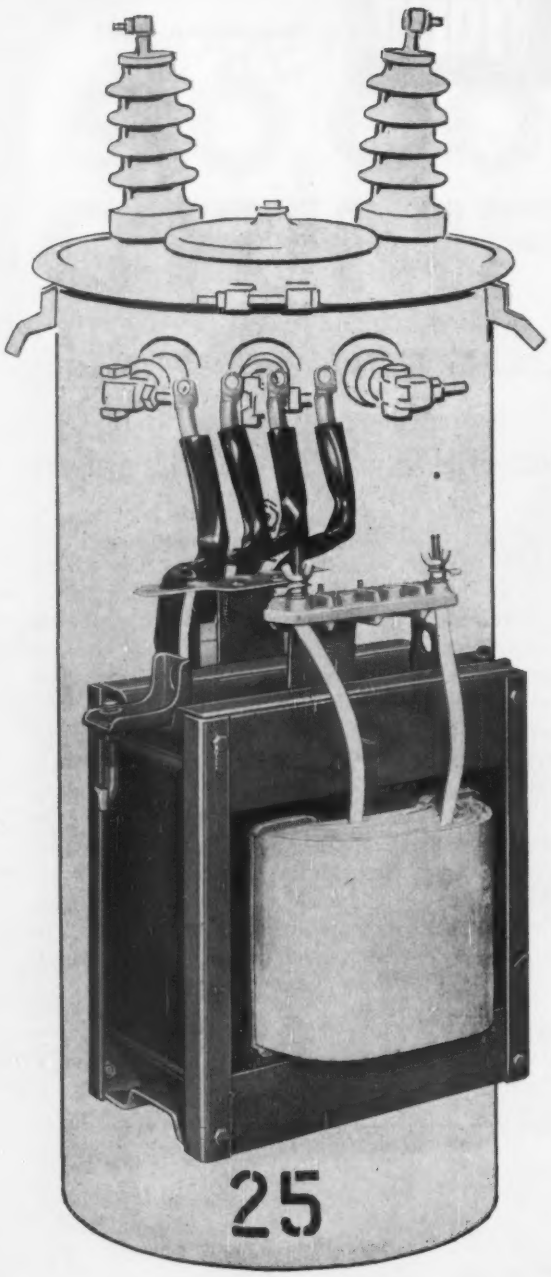

Central's "7000" Series
Distribution Transformer
with DURA-PAK Core
and Coil has a 2.5 to 1
Copper-to-Core Loss Ratio!

LOWER TOTAL LOSSES

DURA-PAK features lower copper losses, lower total losses, lower impedance and better regulation (especially during peak load conditions) to give the utility LOWER OPERATING COSTS, INCREASED LOAD REVENUES and FEWER CHANGE OUTS.

DURA-PAK'S new insulation system, with 130°C Heavy Epoxy insulation on both high and low voltage conductors, provides MORE OVERLOAD CAPACITY without loss of transformer life. Epoxy insulation shows no hydrolysis and actually contributes to the chemical stability of DURA-PAK's insulation system.

DURA-PAK's rugged, compact construction, plus a special thermo-setting bonding agent, assures INCREASED SHORT CIRCUIT STRENGTH.

Central's constant emphasis on QUALITY led to the design of the DURA-PAK Core and Coil Assembly in which a 2.5 to 1 copper-to-core loss ratio has been achieved—*with no appreciable increase in core loss.* It was this same emphasis on QUALITY which led to the completely new overall design of Central's "7000" Series Distribution Transformer—the transformer with COORDINATED E-T-M* FACTORS.

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Plants at Pine Bluff, Arkansas, and Arcadia, Florida

NEMA

Dateline . . .

Germantown, Md. (*Continued from page 3*)
advise long, 10 to 20-year transition periods. EEI has also suggested that fuel fabricators or insurance pools could buy huge fuel inventories from AEC and lease fuel to reactor operators at going use charge rates. This would cushion the shock of the adverse economic impact and increased nuclear power costs which all concede that direct sales would bring.

AEC's reactor experts estimate that fuel cycle costs of nuclear power will roughly double if private ownership is approved and goes into effect immediately. And the strain of adding fuel inventory costs to plant costs, they reason, would kill some reactor projects underway. For example, the effect on Southern California Edison's planned 365-Mw pressurized-water reactor, if the utility had to buy the uranium fuel, would be an addition of $24 million to the estimated $76-million construction cost.

AEC has just decided not to ask Congress for additional financial incentives for the cooperative reactor program. After the defeat of the proposed generators for the Hanford New Production Reactor, the attitude on Capitol Hill is not sympathetic to new assistance for industry, AEC reasons.

This, together with the move toward direct sales, is being analyzed by some nuclear experts who follow the field closely as a design to put private utilities out of the reactor business altogether. As the theory goes, nuclear power will be made too uneconomical for industry to handle by concerted policy set by majority Democrats of the Joint Committee on Atomic Energy and a Democratic-controlled AEC. The next part of the design, as seen by the experts, coming when the stages are all properly set, will be the re-advancement of the Democrats' favorite suggestion: big federal reactor construction programs.

Letters

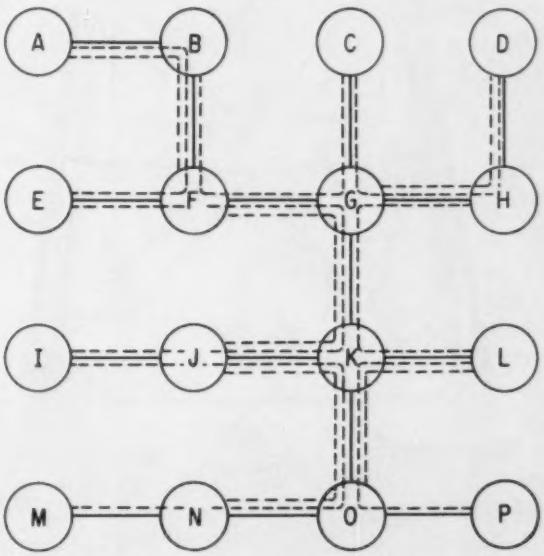
The Mistake Was Ours!

To the Editor:

Many of us feel rather solid satisfaction in having an article published in *Electrical World*. In the case of my article "How to Account for Energy in Complex Interconnections" beginning on page 42 of the Oct. 23 issue, this satisfaction is dimmed by an unfortunate error which will cause readers no end of confusion.

Apparently Fig 5, page 44, was rotated 90 deg counterclockwise and then lettering put on beginning at the top left. This destroys the correlation between Fig 5 and the table, page 45, showing the radial interpretation of meter readings from Fig 5.

W. R. Brownlee
Southern Services, Inc, Birmingham, Ala.



▶ *Electrical World's* own solid satisfaction in presenting an article by such an authority as W. R. Brownlee has been dimmed too by this unfortunate error. For substitution, the correct diagram is reproduced above with our apologies.

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A statement of importance to the electric utility industry

Four years ago the first Universal Pressure boiler system went on the line. This was the pioneer installation at the Philo Plant of Ohio Power Co. (AEP System).

Today, 16 Universal Pressure boiler systems—totalling 6,450,000 kw—are installed or on order from Babcock & Wilcox.

During this time, the Universal Pressure boiler has become a major tool to help the industry reduce the cost of power generation. It has thoroughly demonstrated four important advantages: reduced overall plant capital costs, increased availability, increased economy, and lower maintenance costs.

1. Reduced overall plant capital costs. A Universal Pressure boiler weighs 20% less than a drum unit. This means smaller foundations, less building steel, faster erection.

2. Increased availability. A true once-through unit, the boiler's inherent simplicity is resulting in 95% boiler availabilities.

about the B&W Universal Pressure boiler.

3. Increased economy. Ability to maintain steam temperatures over the entire operating range improves the plant's overall efficiency.

4. Lower maintenance costs. After trip-out, the boiler can be entered in 2½ to 3 hours. Fast cold starts and hot restarts can be made without thermal shock.

After careful evaluation of operating results of Universal Pressure boiler sytems, we strongly recommend its use for all electric utility applications involving turbine throttle pressures 2000 psi and up. We firmly believe that a review of the UP boiler system for your specific conditions will show it as the boiler to specify for high-temperature, high-pressure service.

Your B&W representative would be glad to review the benefits of UP boilers with you on request.

The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

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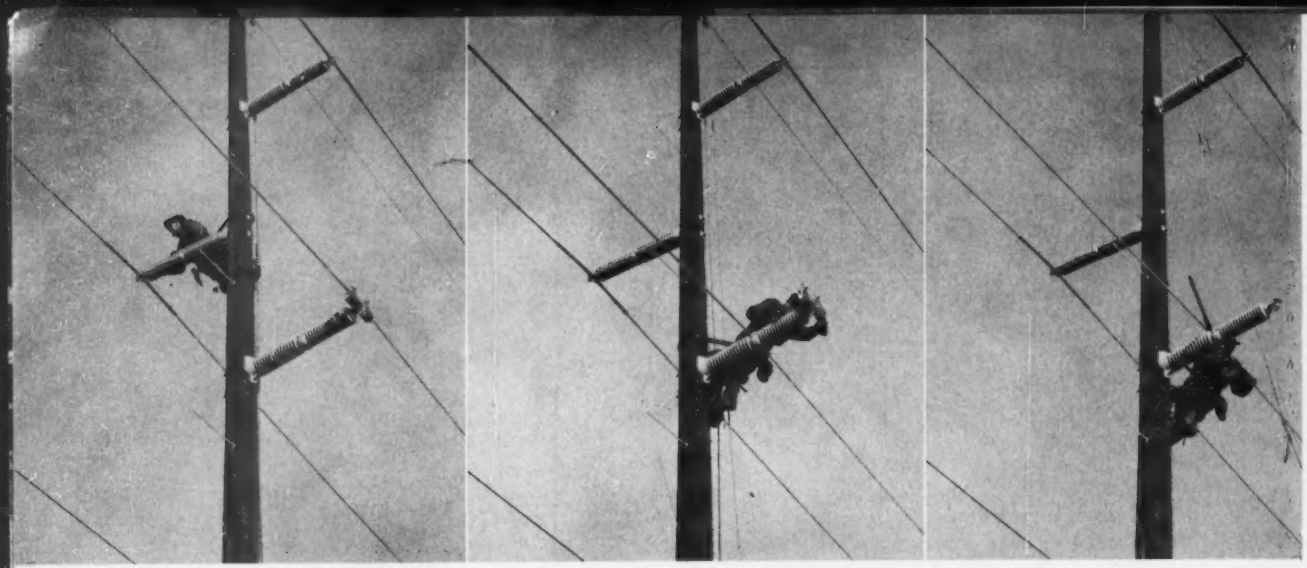
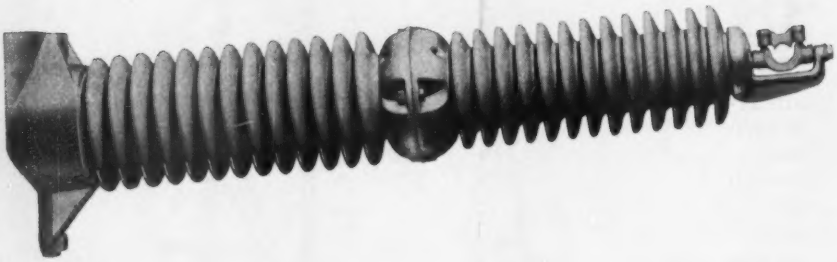
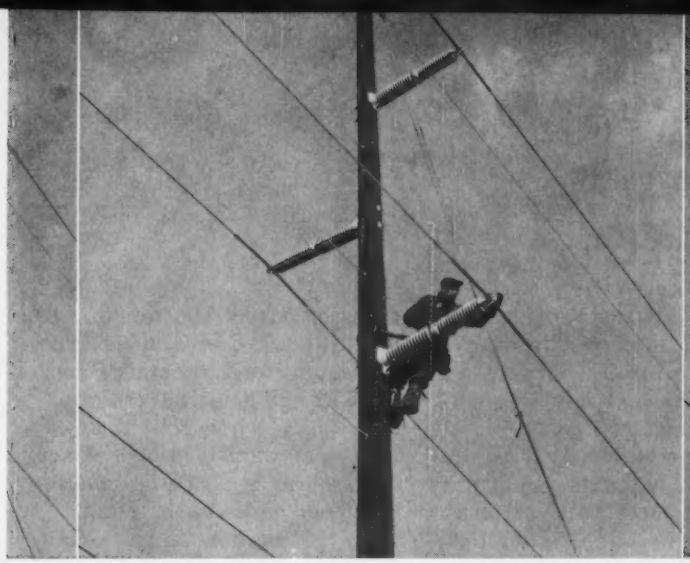
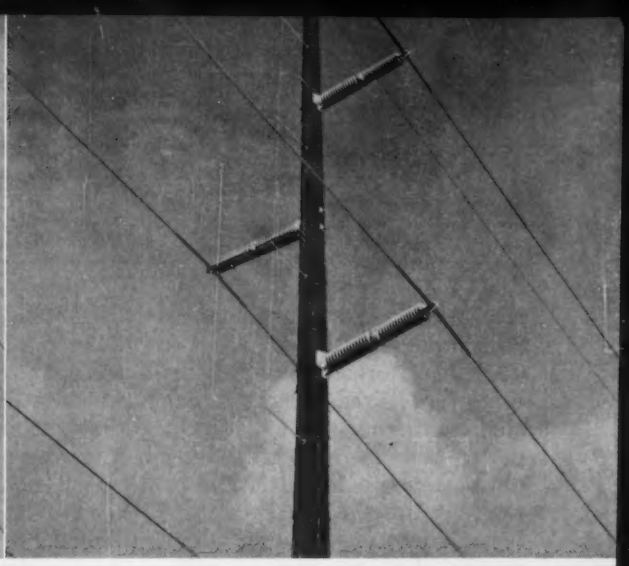


and now HORIZONTALLY-



armless construction requires narrowest right-of-way.....unobtrusive





MOUNTED LAPP LINE POSTS FOR 115-138 kv TRANSMISSION

Armless construction using horizontally-mounted Lapp Line Posts is now a standard practice with many utility companies for transmission and sub-transmission lines at voltages up through 69 kv.

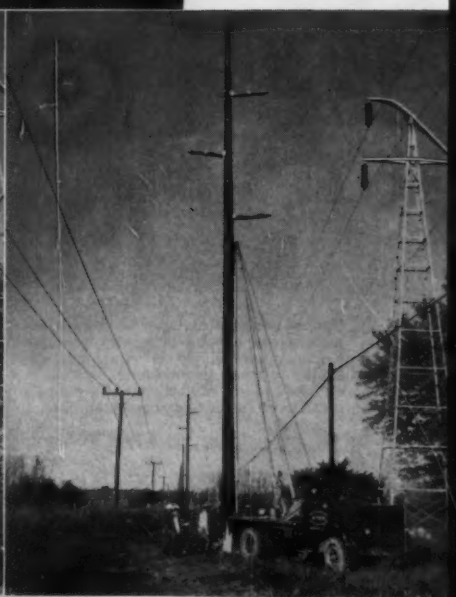
Now the same advantages of such armless construction are available for transmission at 115 kv and 138 kv. The externally-attached integral gain base is a malleable iron casting which provides maximum contact to pole. Insulator is bolted directly to the pole by bolts at top and bottom of the base. The structure is easily assembled on the ground before erection, as shown in the picture sequence below. Clamp-top head with trunnion clamp makes for easy one-man assembly to conductor.

Units of two strength classes are available, each in three lengths, which match (and, in some important characteristics, exceed) flashover values for strings of 6, 7, and 8 suspension insulators.

Write for complete data. Lapp Insulator Co., Inc., Le Roy, N. Y.

"low voltage look" for use in built-up areas

Lapp

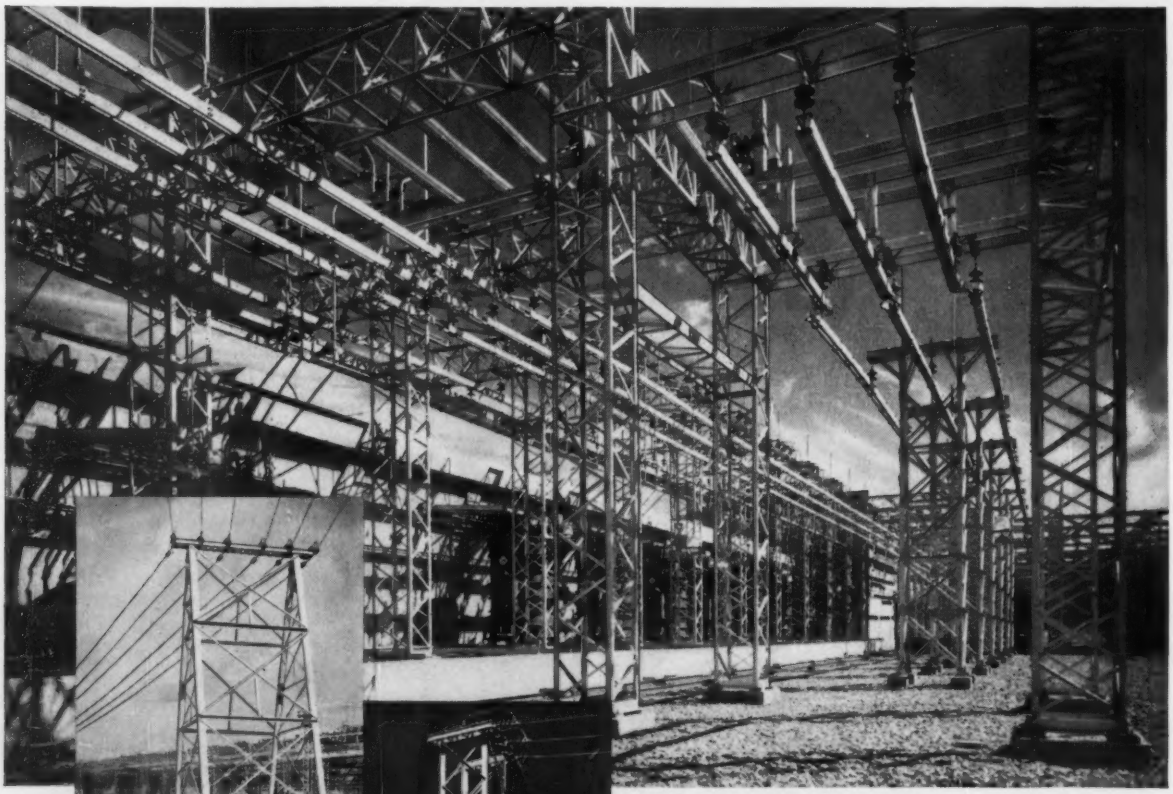


REYNOLDS ALUMINUM "custom tailors" substations to lower your costs

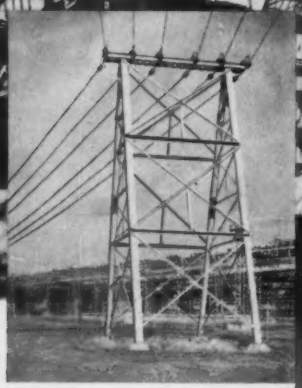
At Phoenix, Arizona, Reynolds Structural Fabricating Division is designing, fabricating and assembling structures in lightweight aluminum from the ground up, rather than merely substituting aluminum in conventional designs. Aluminum's light weight facilitates fabrication and assembly. And the strength plus light weight advantage of aluminum extrusions permit a 60 to 70% reduction in structure weight while retaining load-carrying capacities of structures made of heavier materials. The result: savings in metal, savings in weight, savings in shipping, handling, and erection costs.

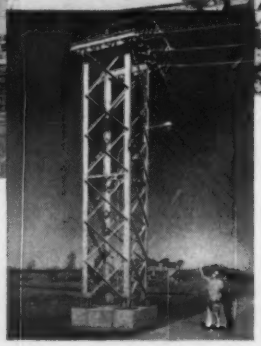
Aluminum substations require an absolute minimum of maintenance. Aluminum never rusts. Periodic protective painting that over a period of years can cost more than the original structure is not necessary with aluminum. Also with aluminum, there's no problem of painting "hot" structures or costly shutdowns for maintenance. Corrosion-resistant aluminum structures are ideal for seacoast and industrial areas.

Reynolds can offer a complete series of standard aluminum structural shapes or design new shapes to fit your requirements. For complete information on aluminum substations that will deliver longer service at a lower per year cost, write *Reynolds Metals Company, P.O. Box 2346-EL, Richmond 18, Virginia.*



Light, bright aluminum substations not only look good, but *stay new looking* without expensive maintenance.





Various structural units for substations and switchyards can be built with standard aluminum structurals or structurals designed to meet specific requirements. In either case, prefabrication and assembly mean lower handling and erection costs.

Watch Reynolds exciting TV programs on NBC: The Dick Powell Reynolds Aluminum Show every other Tuesday; Say When, weekdays; All Star Golf—in living color—every Saturday.

PUBLIC SERVICE CO. OF COLORADO uses pole-mounted electronically controlled L-M reclosers to protect all main feeder distribution lines. Here an L-M Type WE recloser protects a 9000 kva, 7,620/13,200 grounded wye feeder in a suburban location, supplying a combination residential, commercial and industrial load.

Public Service of Colorado Simplifies Protection With L-M Electronic Reclosers

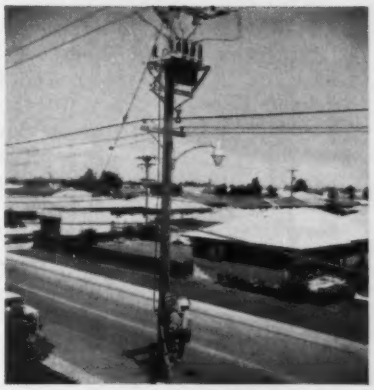
Several years ago, engineers at Public Service Company of Colorado developed a plan to simplify the application of protection to 7.6/13.2 kv distribution feeders. This simplification is employed on both new loads and conversion of overloaded 4 kv areas, and involves the use of heavy duty single-phase and 3-phase reclosers and sectionalizers.

Main feeders of 6000 to 9000 kva supply power to distribution laterals. These lateral circuits constitute most of the exposure of the feeders and are subjected to the majority of the faults. Standardized L-M reclosers, sectionalizers, and cutouts protect these lateral lines.

The introduction of L-M Type WE and Type RE reclosers with electronic control has added a new dimension for PSCo. of Colorado to the simplification of protective equipment application. With these pole-mounted three-phase reclosers, load increases and necessary protection changes can be made with maximum flexibility. Minimum phase trip and ground trip current ratings can be changed by simply replacing present cartridge with a new cartridge of desired rating as the load grows.

No down time for untanking or relay changing is necessary. L-M electronic Type WE and RE reclosers provide greater flexibility, greater accuracy, and greater accessibility than do other reclosers or OCB's.

Get complete details from your L-M Field Engineer on how your system protection can be simplified, at a cost lower than other comparable protective devices. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Limited, Toronto 13, Canada.



L-M TYPE RE RECLOSER with electronic control can be easily installed in substation or on pole top. Here the control cabinet is conveniently located at the bottom of the pole. Connection between recloser and control is made by a plug-in control cable.

LINE MATERIAL® Industries

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Reclosers, Sectionalizers, and Oil Switches

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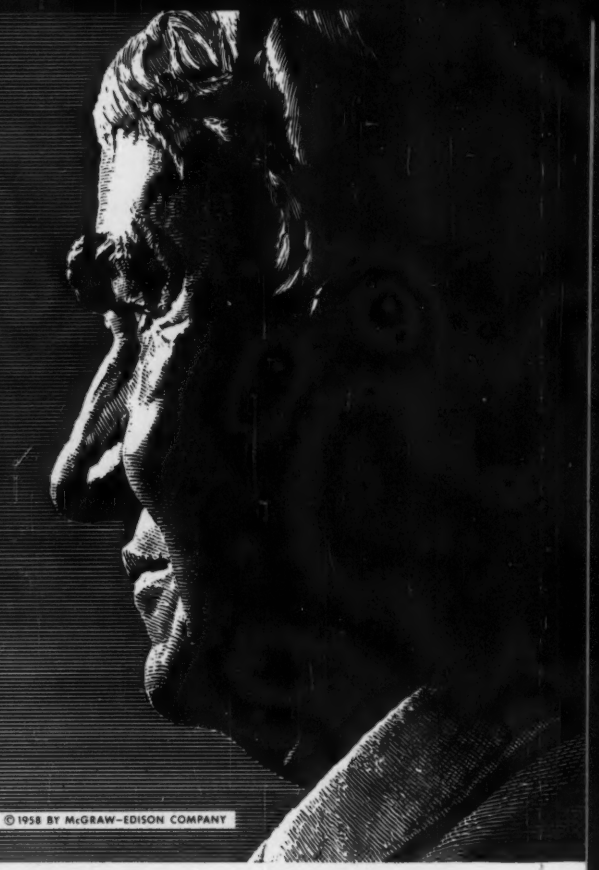
DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES · FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS · OUTDOOR LIGHTING · LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE & CONDUIT

"There's a way to do it better – find it"

Thomas A. Edison



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THIS PLAQUE, displayed in the various Thomas A. Edison Laboratories and many offices of McGraw-Edison Company, is a constant inspiration and reminder to seek and develop ever better methods and products. In the Thomas A. Edison tradition, Duralem is the latest, most significant development of Thomas A. Edison Laboratories.

We *Have* Found The Better Way...

Duralem(tm) Transformer Insulation

More than five years ago, Line Material engineers began working to develop a better insulation for Round-Wound® transformers.

In the tradition of Thomas A. Edison, we have found a better way. The Thomas A. Edison Laboratories of McGraw-Edison have just announced the development of a new process for treating paper that greatly increases its resistance to high temperatures.

Now Used in Round-Wound Transformers

We have named the paper treated by this process "Duralem." L-M Round-Wound® transformers will now use the Duralem insulation system.

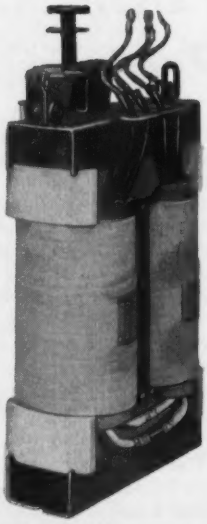
The additives used in Duralem insulation have an exceptional affinity for the paper, combining chemically with the fibres throughout the sheet. Duralem has been found to have exceptional life at elevated temperatures.

Dielectric strength, toughness, tensile, tear, and burst strengths as well as foldability show remarkable improvement when exposed to high temperatures.

Naturally very thorough and extensive tests have been conducted by Line Material in conjunction with the Edison Laboratories to confirm the uniformly high results shown by preliminary testing.

Get Complete Information on Duralem

Ask the L-M Field Engineer for additional information on the improvements made in L-M's new Round-Wound transformer and the benefits of the Duralem system. Or write Line Material Industries, Milwaukee 1, Wis.



DURALEM INSULATION will give this Round-Wound® core-coil assembly much greater resistance to high temperatures, better dielectric strength, and improved mechanical strength to resist short circuit forces.

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Distribution Transformers

McGRAW EDISON

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DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES · FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS · OUTDOOR LIGHTING · LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE & CONDUIT

NEW connectors on cover bushings, with larger openings, for both copper and aluminum conductors

NEW 2-piece band cover closures

NEW 1-bolt hand-hole covers

NEW all-Levroc covers

NEW internally clamped bushings

NEW lifting lugs

NEW Duralem insulation

NEW lower total losses

NEW lighter weight

NEW smaller size

THE REVOLUTIONARY NEW ROUND-WOUND TRANSFORMER with new Duralem insulation offers many remarkable improvements—smaller size, lower losses, assurance of long life. Duralem insulation is a new, thoroughly tested development of the Thomas A. Edison laboratories of McGraw-Edison Company in cooperation with L-M Transformer engineers.

New Round-Wound® BB Transformer Has Duralem(tm) High-Temperature Insulation

For several years Line Material Transformer designers have been working on the development of a new Round-Wound transformer that takes even greater advantage of the exceptional cooling of the Round-Wound design.

Exceptionally Good Cooling

Because the two round coils provide greater exposure of windings to cooling oil, the Round-Wound design has always resulted in significantly lower hottest-spot temperatures, and lower average copper temperatures, thus creating the lowest temperature gradient in the industry.

As the development of Duralem insulation progressed, it became evident that the new transformer could take even greater advantage of the Round-Wound cooling system by using this newly developed high-temperature insulation.

The result of the design changes and the use of the Duralem insulation is a new transformer that is shorter (38″ high for the 25 kva, 7200 volt unit as against 45″), and appreciably lighter.

Lower Overall Losses

Losses have been reduced substantially—as much as 16% in some ratings. In addition, many improvements in mechanical features will contribute to performance, convenience, life, and ease of installation.

The new transformer will be available shortly in 10, 15, and 25 kva ratings; additional sizes will be released very soon.

Get Complete Information

Ask the L-M Field Engineer for details on this remarkable new Round-Wound BB Transformer and a copy of the AIEE paper on Duralem insulation; or write Line Material Industries, Milwaukee 1, Wis.

THE NEW L-M-EXCLUSIVE SRT transformer will also embody all the many improvements of the conventional Round-Wound transformer. Ask the L-M Field Engineer for complete information on the SRT®

LINE MATERIAL® Industries

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Distribution Transformers

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS, SECTIONALIZERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
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Read about the most important development

A recent Cyclone Fence development promises to revolutionize industrial fencing throughout the United States. After years of vigorous research, and production line debugging, we are manufacturing an aluminum-coated steel fence of such high quality that we are willing to give it the Cyclone name. Nine years of field testing indicate that no other type of fence can economically match Cyclone Aluminum-Coated Fence's combination of corrosion resistance, tensile strength and heat resistance. Yet the price is only slightly above first-quality galvanized steel fence.

FIRE RESISTANCE

In a brush or debris fire, not uncommon along a fence line, temperatures can easily climb to the 1,300° mark. If the fence fabric melts, your property protection goes with it. The steel in Cyclone Aluminum-Coated Fence will not melt at temperatures below 2,850°. Repeated tests have shown that our aluminum-coated fabric can withstand temperatures as high as 1,650° and still retain its protective coating, and 2,000° for brief periods without the destruction of a single strand of wire.

STRENGTH

The steel wire used in Cyclone Aluminum-Coated Fence has a minimum tensile strength of 80,000 psi, and that strength is retained as long as the coating remains intact. What does this strength mean to you? In actual tests, USS Cyclone Aluminum-Coated Fence was rammed by a car traveling at 35 mph. Not a single strand of wire was broken. ■ Buyers must not underestimate the necessity for strength in industrial fence. If you could "fence your fence" to protect it there would be no problems. But fence has to stand alone, and withstand vandals, side-swiping vehicles, and all sorts of mechanical abuse.

Protect it with USS CYCLONE

in the history of property protection fence

CORROSION RESISTANCE

Our Research and Metallurgical people have found accelerated weathering and salt spray tests are misleading, therefore the following data is from actual service records: After 9 years of continuous exposure to a severe industrial atmosphere (Cleveland), Cyclone Aluminum-Coated Fence shows practically no deterioration. Even after 9 years of severe marine exposure, 90% of the surface was free of corrosion.

PRICE

The normal market prices for USS Cyclone Aluminum-Coated Fence are only slightly above prices for galvanized chain link fence. And remember, for this very slight premium you're getting the combination of aluminum and steel that gives you superior corrosion resistance and long lasting strength.

KNOW THE BRAND

Cyclone is a brand name, not a type of fence. When you buy USS Cyclone you're getting a fence that's pre-engineered, prefabricated down to its smallest part. The Cyclone-developed H-Post is built like a steel beam for extra strength; Cyclone gates are sleeve-constructed—not welded—so they can be easily repaired; one-quality, full-weight fabric; deep-set post installations that don't skimp on concrete or steel, and professional installation by long-time Cyclone crewmen who know how to put up a fence to stay. ■ USS Cyclone has sales offices all over the country and a reputation built on the fact that Cyclone is the most widely used property protection fence in the world. Cyclone Fence is backed by the American Steel and Wire Division of United States Steel—a company that will be around tomorrow to live with what it sells today. ■ 69 CYCLONE BRANCH OFFICES. Cyclone has 69 branch offices throughout the country. Which means, wherever you are, we're reasonably close by. Give us a call next time you need fence around your company's property. Check your Yellow Pages under "Fence." For a brochure on new Cyclone Aluminum-Coated Fence, write American Steel and Wire, Rockefeller Building, Cleveland 13, Ohio.

USS and Cyclone are registered trademarks.

Steel For safety, dependability, economy.

USS **American Steel and Wire Division of United States Steel**

Switch & protect residential underground circuits . . . in air

The pad mounted transformer illustrated above features easy access to both primary and secondary connections. The transformer manufacturer has used an S&C pad mounted fused disconnect on the incoming side. The hinge of the primary fuse, visible between the two barriers, mounts directly on the side bushing of the transformer. Flanking the fuse are two disconnects, permitting the transformer to be isolated without disturbing the incoming cable connections.

S&C's new pad mounted gear employs fuses and disconnects expressly designed for compact air-filled enclosures

The simplicity and practicality of overhead distribution practices are now available on residential underground circuits. "Air-filled" S&C pad mounted gear switches, protects and isolates pad mounted transformers and buried cables. It provides all these advantages, too:

1. Full load switching and fault interruption are *outside the transformer*. No arcs are drawn under oil to cause fires, "burping," contamination. External switching also means *visible air gaps*.

2. Fuse eliminates need for primary link inside transformer. Transformers needn't be untanked for re-fusing.

3. Wide choice of fuse ratings (up to 200E amperes continuous) permits close coordination, anticipates load growth.

4. Both transformers and cables can be switched. This applies to load currents, charging currents, and magnetizing currents.

5. Eliminates the hybrid combination of overhead sectionalizing with pad mounted transformers—puts your residential distribution system entirely underground.

You can order S&C pad mounted gear in almost any disconnect and fuse arrangement for sectionalizing . . . or components for transformer primary applications.

The fused disconnect above is S&C's Standard Duty Style; the disconnects are rated 200 amperes continuous (8,000 amperes momentary); the fuse is rated up to 50 amperes continuous, 8,000 amperes interrupting. With Loadbuster, the disconnects and the fuse can switch full load.

S&C ELECTRIC COMPANY

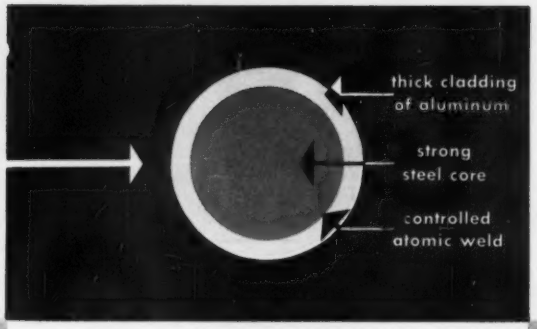
4421 Ravenswood Avenue • Chicago 40, Illinois

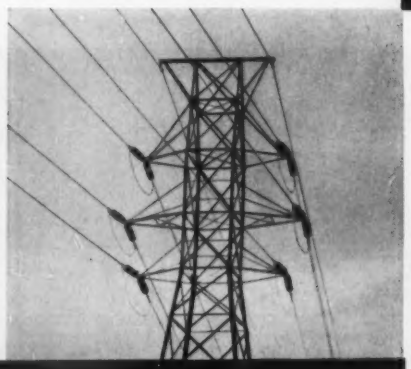
Specialists in High Voltage Circuit Interruption since 1911

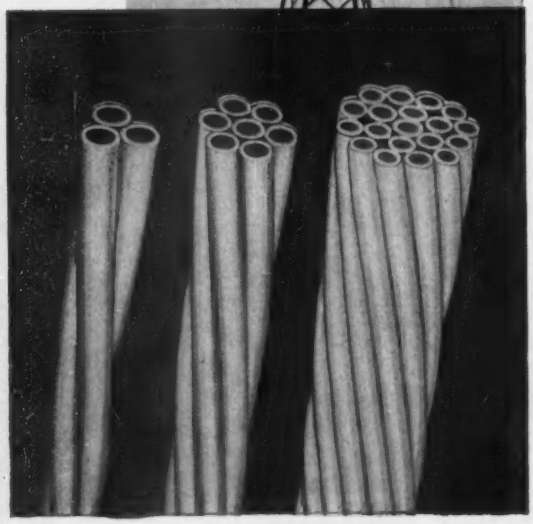
S&C Heavy Duty Pad Mounted Fused Switching Unit shown above is a complete, free-standing device—functioning, in this case, as loop tap serving adjacent pad mounted transformer. Disconnects are rated 600 amperes continuous (25,000 amperes momentary). Power fuse is rated up to 200 amperes continuous, and 17,500 amperes interrupting.

Note how visible circuitry reduces chance of operator error. With Loadbuster, S&C's portable loadbreak tool, the operator can switch full loads—up to 400 amperes at 14.4 kv.

HERE'S THE SECRET OF *LESS OVERHEAD* IN OVERHEAD LINES







ALUMOWELD WIRE AND STRAND

Alumoweld, the only aluminum-covered steel wire with a thick layer of pure aluminum, is made by an exclusive controlled atomic-welding process which assures a ductile and permanent weld between the two metals under all operating conditions. You'll cut overhead costs and assure top performance of your overhead lines when you use Alumoweld for overhead ground wire, guys, messengers and ACSR core wire.

Alumoweld possesses the best features of both aluminum and steel. It has the strength of steel plus the corrosion resistance and conductivity of aluminum. And it's light in weight, easy to handle.

FOR OVERHEAD GROUND WIRES: Alumoweld is just as strong as steel and is 18% lighter. The high strength-to-weight ratio permits stringing with smaller sags, thus increasing the mid-span clearance. Its excellent conductivity—three times that of steel—effectively discharges transient currents to ground. Service interruptions are reduced.

FOR GUYS AND MESSENGERS: Because Alumoweld cannot rust, it assures long, trouble-free life. And it's strong and easy to install.

FOR ACSR CORE WIRE: Alumoweld is the ideal reinforcing material for ACSR conductors because of its high strength and excellent conductivity. And since Alumoweld is compatible with solid aluminum wires, it eliminates the danger of electrolytic action.

ALUMOWELD

Write for Engineering Bulletin E.D. 3000.

COPPERWELD STEEL COMPANY

Electrical World

NOVEMBER 6, 1961
Vol. 156, No. 19

Preview of the Issue

DEPARTMENTS

Editorial Comment 53
Dateline 3
Letters 5
Electrical Week 20
Supply Lines 21
EUM 69
Today's Design Trends.. 74
Manufacturers News ... 82
New Equipment 90
Management Newsletter. 93
Selling 101
News About People... 102
News Scope..... 108
Meetings Calendar 112
Advertising Index 112

● **AUTOMATIC WRITE-OUT SPEEDS network analyzer studies. Readings are typed on system line diagrams.** 62

● **12.5-KV LOAD IS SERVED DIRECTLY from 138-kv lines, obviating intermediate 34.5-kv transformation at some Commonwealth Edison substations.** 64

● **VANDALS ARE FOILED by butyrate street-lighting globes that resist amateur marksmen's target practice.** 66

● **RADIAL SERVICE IS BOLSTERED by remote tie breaker that provides alternate power source for business area.** 68

CURRENT EVENTS

14 MIDWEST UTILITIES push for integration of federal hydro in the eastern Missouri Basin with local thermal systems. 54

ALL CONTROVERSIAL UPPER COLORADO LINES will be built by the Reclamation Bureau, unless local systems offer compelling alternatives, Commissioner Dominy declares. 57

EEI REPORTS 13-million-kw generation increase by United States utilities in 1961. 108

DATELINE

OPINIONS VARY on the merits of having the Atomic Energy Commission recommend selling nuclear fuels directly to utilities 3

ELECTRIC UTILITY METHODS

'DIVING BOARDS' safely simplify and speed hot-stick installation of suspension insulators . . . Pitot tubes are sealed effectively. 69

MANAGEMENT NEWSLETTER

COMPETITION AND ADMINISTERED PRICES are discussed by the chairman of the Tennessee Valley Authority, Herbert Vogel. 93

MANUFACTURERS NEWS

$1.5-MILLION LAB will do research on copper, copper-base alloys, and other metals . . . Once-through boilers for 2,000 psi and up are recommended. 82

MEETINGS

ONE-COMPANY OPERATION of all Iowa utilities to counter federal power's continuing expansion is urged at state management conference. 59

CONCERTED ACTION is needed to sell electric space heating, speaker tells Electric Council of New England meeting. 60

COORDINATE AND STREAMLINE RESEARCH by technical societies, speaker presses National Power Conference. This would cut costs and broaden studies. 76

PUT YOURSELF ACROSS TO THE PUBLIC, head of Edison Electric Institute urges electric industry. Show you can meet the nation's power needs, he says. 107

POLITICS

KENNEDY ADMINISTRATION IS SET for construction of national alarm system tied to power systems. The go-ahead may come within a month. 56

PRESIDENT BOOSTS SPENDING for natural resources work in fiscal 1962, but he plans to save some of the appropriation by economizing. 58

SUPPLY LINES

RIGGED BIDS CHARGE is leveled against six firms that allegedly filed identical bids with a New York City agency . . . GE prepares to defend its bargaining policy 21

TODAY'S DESIGN TRENDS

PRE-STRESSED CONCRETE POLES permit utility to provide permanent, economical street lighting . . . Aluminum connector cold-flow problem is solved. 74

NEXT WEEK

DIGITAL COMPUTER will automatically control new 342-Mw unit.

LATE NEWS ▶ **Mark W. Cresap, president of Westinghouse,** asks government and industry to work together for survival of freedom and human dignity against Communist aggression. He calls for an end to harassment and suspicion in relations between the groups and suggests both sides try to understand the obstacles to more effective collaboration "without regard for any sacred cows on either side."

A group of seven French and Belgian utilities and electrical suppliers files formal proposal to build a 242-Mw nuclear pressurized water power reactor under the second round of the US-Euratom nuclear power program. The plant would be in a cavern at a bend in the Meuse River, near Givet, France, and the builder would be Westinghouse International. The group, called SENA, will receive a decision from US-Euratom's Joint Reactor Board late this year or early in 1962.

Foreign aid expert Clarence Randall flies back to Washington to report to President Kennedy on Ghana's ambitious Volta River power scheme. At conference in London with British Commonwealth Relations Secretary Duncan Sandys, Randall was urged to support American-British financing despite controversial policies of Ghanaian Premier Kwame Nkrumah. Three-man mission led by Randall was ordered to study the project in the light of economic, rather than political factors, but observers feel the final decision will be made on political grounds.

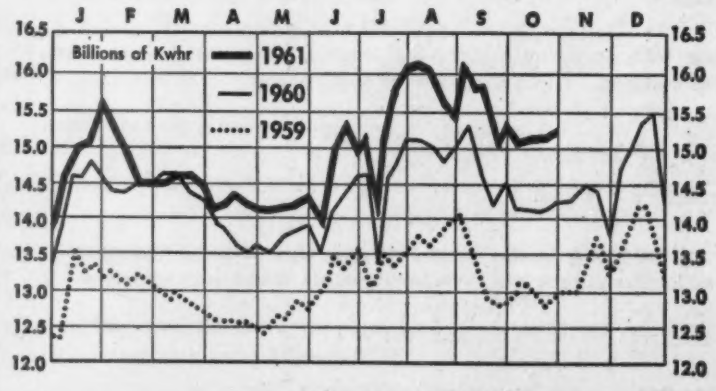
Earl Coe, Washington state conservation director, asks AEC if it would lease the state a site at Hanford works upon which the state could build the controversial $95-million Hanford plant voted down by Congress. He also requests assurance on how long the AEC would provide steam energy as a byproduct of the plutonium reactor now under construction.

Prices of power capacitor equipments are reduced by General Electric Oct. 25, but prices of 50 and 100-kvar capacitors remain unchanged. As an example, stack racks with 100-kvar capacitors are reduced to $2.20 per kvar from $2.24 per kvar.

United Auto Workers and Allis-Chalmers agree to indefinite extension of existing labor agreements, subject to 7-day cancellation upon written notice of either party. Contract expired last week.

Francis E. Manley, Orange & Rockland vice president, is elected president of Fitchburg (Mass.) Gas & Electric Light Co. He succeeds Albert G. Neal, who is retiring after 52 years in the industry.

WEEKLY POWER OUTPUT—Up 7.0% (Week ending Oct. 28), Kwhr 15,263,000,000



Percent Change From Previous Year

	Oct. 14	Oct. 21	Oct 28
Total U.S.	+ 7.1	+ 6.8	+ 7.0
New Eng.	+10.3	+ 9.1	+ 9.1
Mid. Atlan ...	+ 8.6	+ 6.9	+ 5.7
Cent. Indust...	+ 6.4	+ 6.8	+ 6.9
West. Cent....	+ 7.8	+ 6.2	+ 7.1
Southeast	+ 4.3	+ 4.0	+ 2.8
South Cent....	+ 7.5	+ 6.2	+ 8.5
Rocky Mount..	+ 8.8	+11.1	+14.9
Pacific			
NW	+ 5.8	+ 5.1	+11.1
SW	+11.6	+13.9	+10.9

Seasonally Adjusted Index 299

Week Ago 298 Year Ago 279

Source: Edison Electric Institute

SIX CABLE MANUFACTURERS CHARGED WITH RIGGING BIDS

"Conscious parallelism" is under fire in New York State. State Attorney General Louis J. Lefkowitz has brought suit against six power cable manufacturers, charging them with violations of the New York antitrust laws. The companies are alleged to be involved in a conspiracy in which five of the companies "slavishly" adopted the 150-page price schedule and pricing formulas of the sixth firm, when bidding to supply paper lead cable for New York City's Transit Authority.

The companies involved are Anaconda Wire & Cable; General Cable; Phelps Dodge Copper Products; Okonite; United States Steel; and Colorado Fuel & Iron. According to the charge, all the companies adopted the pricing formulas of Phelps Dodge "without making any effort independently to price paper lead cable." Of 107 bids made by the companies over the past six years at the request of the Authority, only one, made five and a half years ago, showed no evidence of similarity of bids, the Attorney General's office said.

In addition, the companies were said to have threatened to refuse to deal with the city agency if, "in an effort to break up the identical bidding situation," the agency consistently awarded the bids to the same company. It is also alleged that the companies threatened not to bid if a foreign manufacturer were invited to join the bidding.

A spokesman for one of the companies defended the similarity of the bids on the grounds that "competitors always have to copy the lowest price sheet put out."

Conscious parallelism has been tested several times in the US Supreme Court with varying results. The most recent ruling, involving the theater industry, holds that parallel pricing does not, in itself, prove conspiracy. And, it is conspiracy that is prohibited by the federal law, not parallel pricing. But this charge is being brought under state law, not federal law.

GE'S NEGOTIATING POLICY ON TRIAL

The NLRB has finished presentation of its case against General Electric, and the New York hearings before a trial examiner will adjourn for at least a week to give GE time to prepare its defense. GE is defending itself against charges brought by the IUE that the company did not bargain collectively during the 1960 contract negotiations.

At issue is GE's negotiating policy, frequently called "Boulwarism" after former GE vice president L. R. Boulware who first formulated the approach. GE makes what it considers a fair offer as negotiations begin, and sticks with that position unless new evidence is brought out which the company feels justifies a change. IUE calls such an approach "bargaining-by-ultimatum," saying that the union is given the first offer and told to "take it or leave it." The AFL-CIO Executive Council, referring to GE bargaining tactics during 1960, said, "GE management never intended to negotiate with the IUE or any union. Instead the company inundated locations where IUE represents the GE employees with shameless misleading propaganda . . . Workers were threatened with loss of job opportunities if GE's contract terms were not accepted *in toto*."

GE insists that it is not bargaining-by-ultimatum. True, the company makes its

original offer. But if the union shows that this offer should be changed, it is changed. All but one of the company's initial offers over the last ten years have been modified during negotiations. Further, the company insists that it has an obligation to keep the workers informed of the progress being made in bargaining, what the company is offering, and what the union is demanding. GE feels that otherwise the workers would only get the half of the picture that the union leadership wants them to have. GE finally points to the National Labor Relations Act which says the obligation to bargain collectively "does not compel either party to agree to a proposal or require the making of a concession."

The union is hitting "Boulwarism" heavily because it fears that other companies, encouraged by GE's success, may try the tactic themselves. Said the AFL-CIO, "The resolution of this case . . . may well affect the entire future of collective bargaining and even the future of American unions themselves."

ALLIS-CHALMERS CUTS REGULATOR PRICES BY 5%

Allis-Chalmers has cut the price of all its 3-phase AFR regulators 751 kva and above. The cut is approximately 5% below the current published net prices. All AFR regulators 750 kva and below and all JFR and SFR regulators remain at present published net prices.

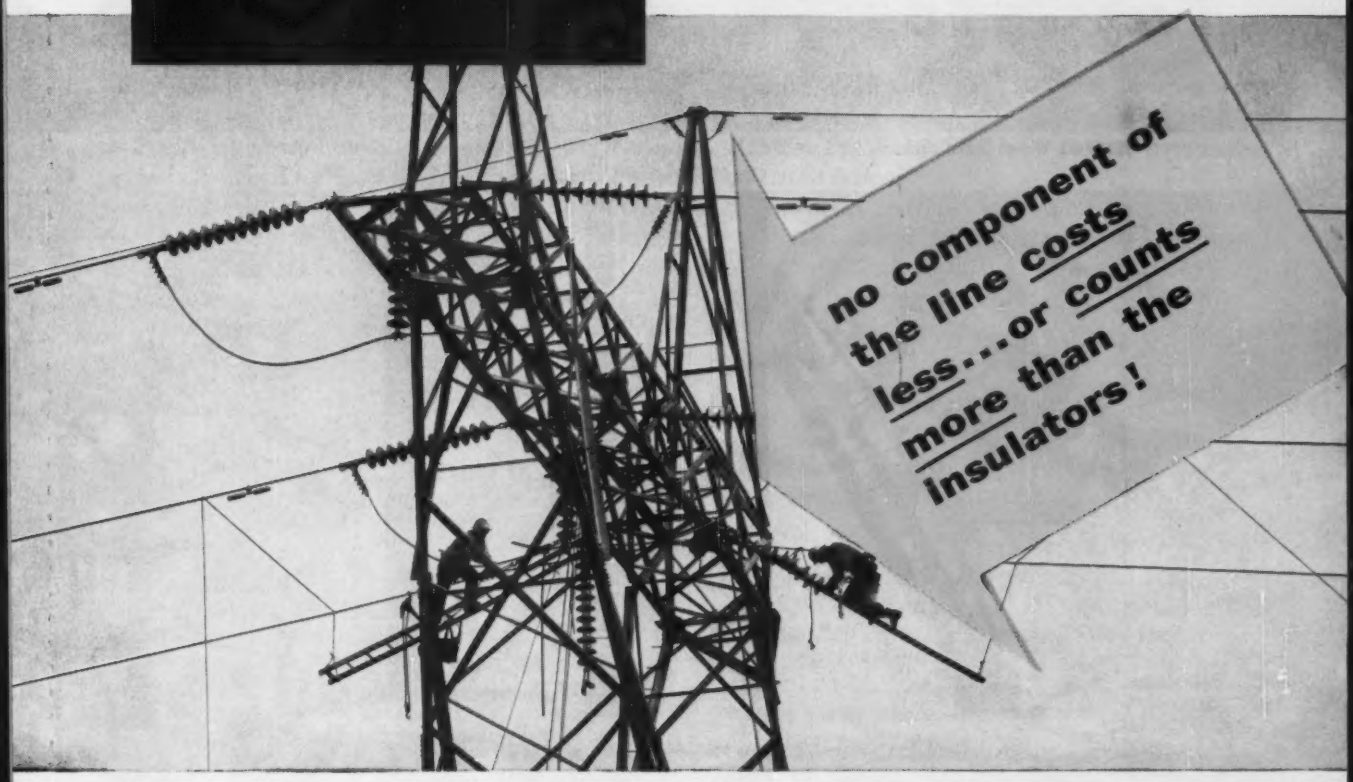
FPC REPORTS ON UTILITY FUEL CONSUMPTION IN AUGUST

	Latest Month	Year Ago	% Change	Cumulative to Latest Month: This Year	Last Year	% Change
Coal (million tons)	15.54	14.92	+4.2	118.43	116.26	+1.9
Oil (million barrels)	6.51	6.10	+6.7	55.64	55.70	-0.1
Gas (billion cu ft)	202.58	195.45	+3.6	1,209.59	1,145.87	+5.6
Total Fuel Consumption (Millions of Equivalent coal tons)	25.30	24.22	+4.5	180.45	175.64	+2.7
Total Fuel Generation (Billions of kwhr)	58.38	55.14	+5.9	417.48	398.86	+4.7

Coal stocks on hand at electric utility plants Sept. 1 totaled 49,969,731 tons, 2.4% below stocks a year earlier, and 3.1% above the 48,480,372 tons in stock at the beginning of the previous month. This is sufficient to last 100 days, based on August consumption. Fuel oil stocks totaled 19,925,003 bbl compared with 19,581,764 bbl a month earlier and 17,399,837 bbl a year earlier. This is sufficient to last 95 days, based on August consumption.

line cost– $85,000 per mile

insulators– $2,500 per mile



This tower has a busy future ahead. It's insulated now for a single 138-kv circuit. Later, it may carry a second 138-kv circuit. And eventually, it will support a bundled-conductor 345-kv line.

At the ultimate voltage, as shown in the figures above, cost of the O-B suspension insulators will total less than 3% of the cost of the line, including right of way.

No component costs less - - yet none is more important to the overall performance of this line.

For the purchaser of suspension insulators, this fact has a double-edged significance.

First, it means that the *overall cost* of a transmission line *cannot be materially reduced* by cut-rate prices on a component that accounts for only 3% of the overall cost.

Second - - and more important - - it means that *overall performance* of the line *can be materially reduced* by the cut-rate quality that usually accompanies cut-rate price.

Nowhere, in other words, do "penny savings" entail greater "dollar risks."

Your O-B representative has convincing proof of this in the form of a 25-minute sound-color film entitled, "The Second 50 Million."

Why not ask him to arrange a showing in your office?

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

10085-H

K1534 4-Wheel Drive Pickup

R1205 Corvan

C1416 Suburban Carryall

1962 CHEVROLET JOBMASTER TRUCKS ARE BUILT TO KEE
SAVING AND SAVING AND SAVING AND SAVING AND SAVIN

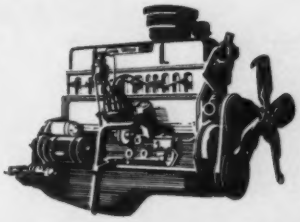
MORE WAYS TO MAKE MORE MILES (AND MONEY)!

Matchless performers... matched to the job. That's what you'll find under the hoods of Chevrolet light-duty trucks for '62. More sure-saving power plants to choose from than ever before. New assurance of the *right* power for the job—power that does just what you want it to so that operating costs stay at a *low* low.

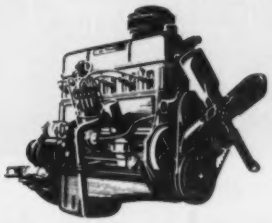
Standard in conventional models is the thrifty High Torque 235 Six, an engine that's powered more payloads than any other. *Then for heavier, harder working jobs that take more out of a truck, Chevy offers two great optional (extra-cost) engines for '62: the big High Torque 261 Six, available for the first time in this weight class, and the spunky High Torque 283 V8 with short-stroke design.*

Add to this engine spread the space-saving High Torque 145 Six provided in Corvair 95 models and you've got a broad, all-purpose lineup that allows you to match the power to your type of work and nurse the last penny's worth of performance out of every operating dollar. Talk it over with your Chevrolet dealer soon. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

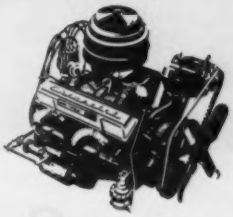
Compact High Torque 145 Six—air-cooled "pancake" design (only 17" high) saves space and minimizes weight by eliminating water jacketing, radiator, coolant and water pump. Gone for good are antifreeze and cooling system maintenance expenses. With fuel-saving valve-in-head design, the 145 Six develops 80 hp and 128 ft.-lbs. of torque—ample for brisk performance with big loads.



Rugged High Torque 261 Six—you get extra torque (235 ft.-lbs. of it) for extra tough pulls, *plus* proved 6-cylinder economy—available for the first time in Chevrolet light-duty trucks. Provides 150 hp and scores of reasons for efficient, cost-saving performance—forged steel crankshaft, high-alloy inlet valves, precision bearings, hard-faced exhaust valves with Rotocoils, to name just a few.



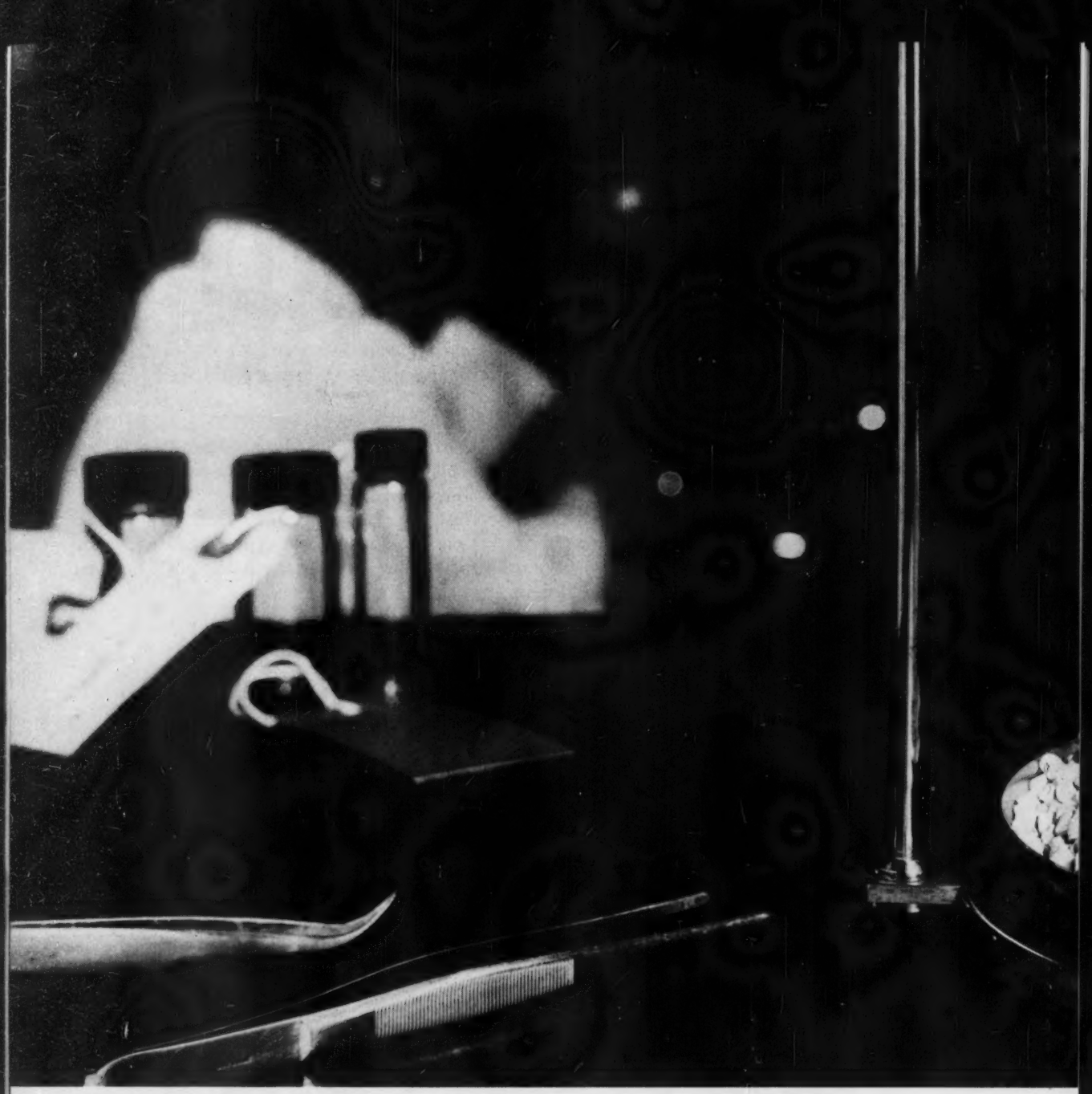
Popular High Torque 235 Six—the most widely used engine in the history of hauling with 235 cubic inches of lean-muscled efficiency. Standard in conventional models, the 235 Six delivers 135 hp and a load-moving 217 ft.-lbs. of torque. Premium-quality features such as forged steel crankshaft, aluminized exhaust valves, oil-bath air cleaner, and precision bearings add to engine durability.



Efficient High Torque 283 V8—made to order for runs that call for the extra punch of V8 power. Advanced short-stroke design knows how to nurse extra power and miles out of every drop of gas. 160 hp and 270 ft.-lbs. of torque get big loads moving quickly and efficiently. Top durability features include chrome-plated piston rings, Moraine 100 bearings and hydraulic valve lifters.

CHEVROLET

AND SAVING AND SAVING AND SAVING AND SAVING

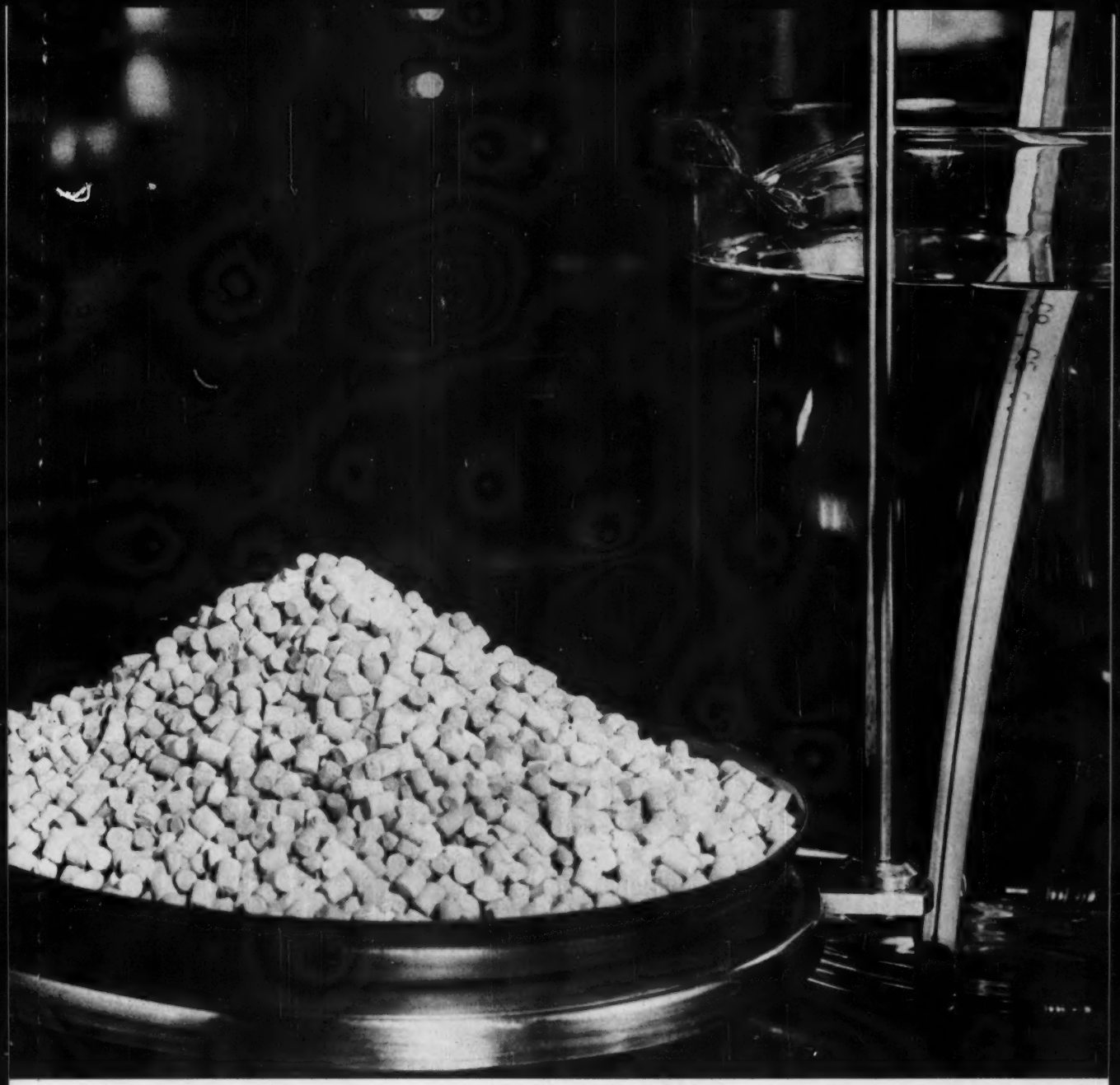


How a new Gulf process makes a lasting

You're looking at a new catalyst (the tiny pellets). It's the heart of Gulf's new hydrogen treating process, called Gulfinishing, used to super-finish Gulfcrest® Oil. Over the years, Gulfcrest Oil has piled up amazing performance records as a turbine lubricant. Many electric utilities have reported Gulfcrest in service for 20-25 years. An enviable record in an industry that demands ultimate dependability. But, Gulfcrest has been improved and is now better than ever. How?

Gulfinishing replaces the conventional acid and clay treatment for producing base stocks. It removes more undesirable compounds than any other process. It converts unstable molecules into stable ones. And, it remarkably improves the additive response of the base oil.

The results: the oxidation life of new Gulfcrest is even longer; color stability and corrosion resistance even better. In short, the all around performance of



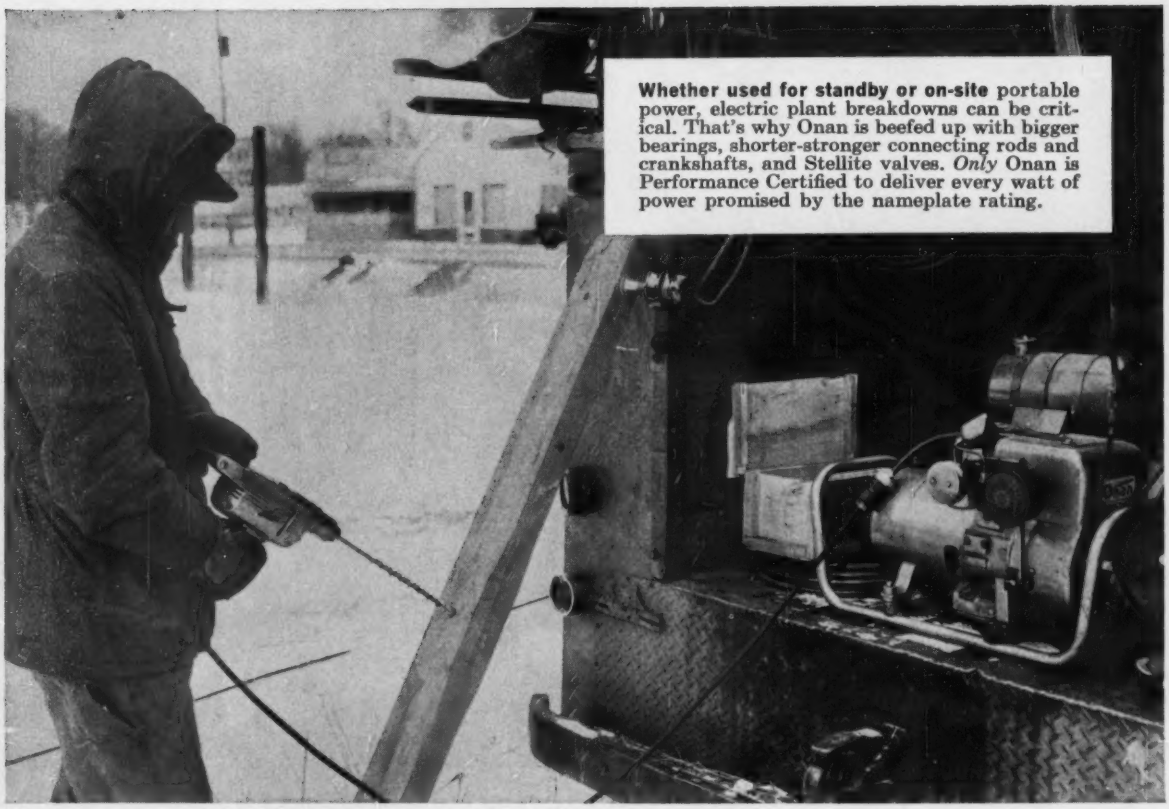
oil almost everlasting

new Gulfcrest cannot be matched by any other oil.

If you would like additional information on new Gulfcrest, contact your nearest Gulf office. Or write us for free brochure. Gulf Oil Corporation, Dept. DM, Gulf Building, Houston 2, Texas.

GULF

GULF MAKES THINGS RUN BETTER!



Whether used for standby or on-site portable power, electric plant breakdowns can be critical. That's why Onan is beefed up with bigger bearings, shorter-stronger connecting rods and crankshafts, and Stellite valves. *Only* Onan is Performance Certified to deliver every watt of power promised by the nameplate rating.

Only Onan is certified to give you all the power promised by its nameplate

It's a fact that many electric plants on the market today do not deliver the output promised by their nameplate rating.

Every Onan plant is given a rugged workout *under full load* before it is shipped—*your assurance* that the Onan you buy is ready for hard work the day you get it.

But this isn't enough. Independent laboratory inspectors pull surprise inspections to double-check our tests and testing methods. They pull a plant off the line, run it, stop it, load it, overload it, check and recheck. Their torture test gives positive proof of Onan's quality. End result: *Onan's exclusive Performance Certification* . . . your assurance of getting every watt of power you pay for.

So when you're tempted by an electric plant "bargain," make sure its nameplate rating is not "inflated." Be sure you're getting full measure for your money. Remember, *the electric plant that short-changes you in power output is no bargain at any price!* Only Onan is Performance Certified to deliver everything the nameplate promises.

See Onan electric plants soon. Compare before you buy. You'll find your Onan distributor listed in the Yellow Pages. Call him or write direct.

PERFORMANCE CERTIFIED
We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.
Onan
Onan
World's Leading Builder of Electric Power Plants

Onan

ONAN Division, Studebaker-Packard Corporation, 2597 University Ave. S. E., Minneapolis 14, Minn.

1. Exclusive keeper — top rail rides under clamp body, prevents relaxing cantilever action on keeper.
2. V-Groove provides surer contact with each strand of cable.
3. Special guide positions conductor in groove.
4. Extended "beak" guides clamp onto conductor, minimizes arcing.
5. Protected threads — prevents freezing of moveable parts and "seizing" of threaded members.
6. Extended body rail seats in any standard hot line stickhead.
7. Eyebolt housing is part of main casting for optimum current path.
8. Anderson eyebolt designed to withstand season cracking and stress corrosion.
9. Keeper guide lug—maximizes keeper stabilization.
10. High compression spring insures full contact pressure at all times.
11. Extra heavy stainless steel drive screw prevents disassembly and interference during installation.
12. High strength aluminum bronze eyestem—will withstand severe torquing stress.

INSIDE AND OUT...

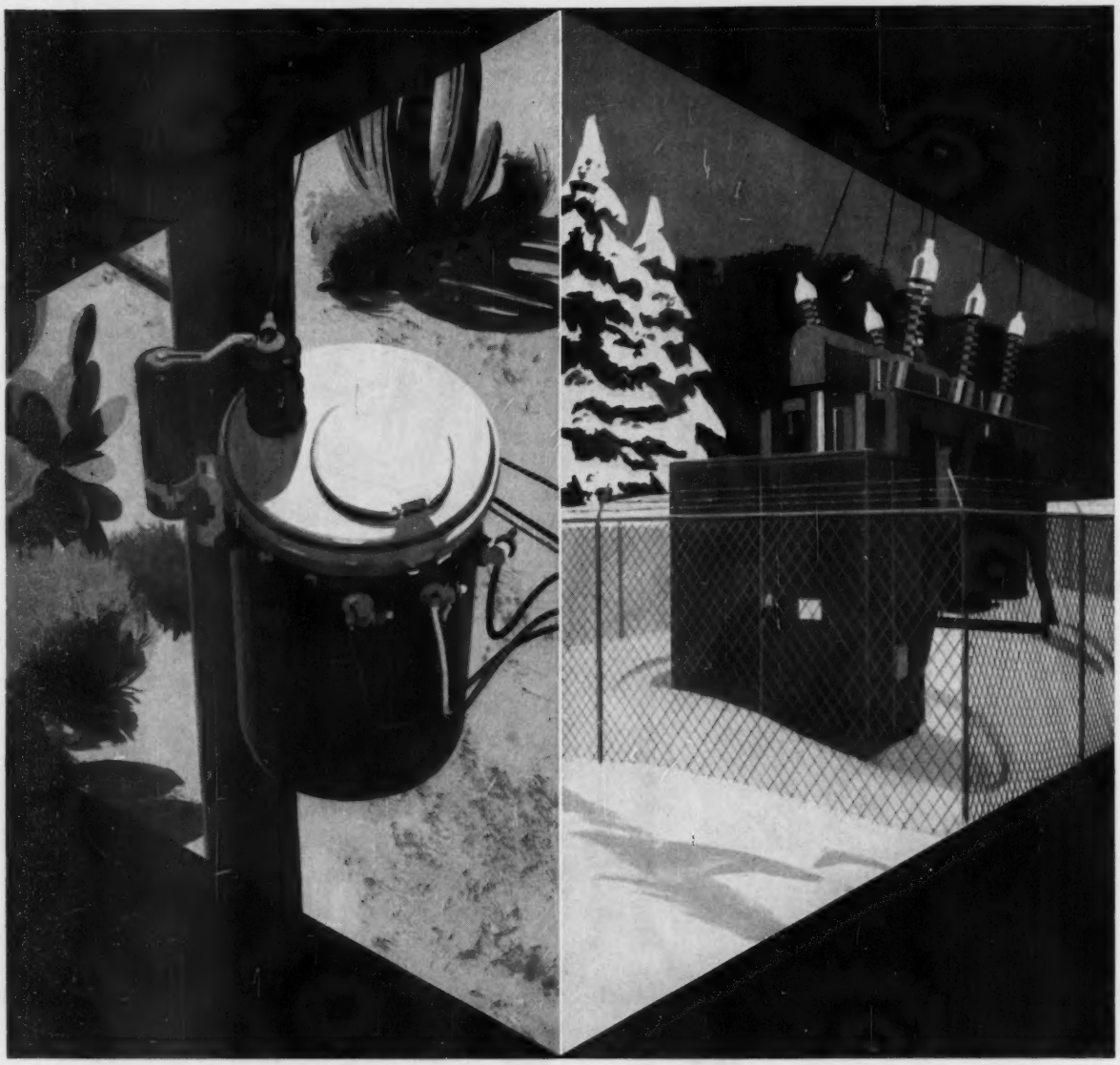
12

REASONS (CHECK 'EM) WHY ANDERSON'S DURA-TAP HOT LINE CLAMPS ARE THE BEST IN THE BUSINESS

AH (aluminum) shown here in cutaway view, and BH (bronze) Dura-TAP hot line clamps are each available in three sizes to cover all popular conductor ranges. Both AH and BH may be ordered with a superior hot-flowed plating for general purpose use. Anderson Electric Corporation, Leeds, Alabama.

ANDERSON ELECTRIC CORPORATION

Research / Quality / Performance / in Aluminum and Bronze Products



New Sunoco dual-purpose electrical oil gives you better heat transfer at high temperatures . . . better flow at low. This new oil offers you both a 25 F higher flash point for reduced evaporation losses and minimum fire hazard, and a low viscosity for excellent flowability and better heat removal.

In tropic heat or arctic cold... new dual-purpose electrical oil provides better efficiency

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You can have the economy of large volume purchasing of only one oil for both transformers and circuit breakers: Sunoco Transformer-Circuit Breaker Oil A-HT.

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Your Sunoco representative can show you how to effect savings right now. Or write for new Sunoco technical bulletin containing additional information. Address:

Sun Oil Company, Philadelphia 3, Pennsylvania, Dept. EW-11. In Canada: Sun Oil Company Limited, Toronto and Montreal.

PIONEERING PETROLEUM PROGRESS FOR 75 YEARS

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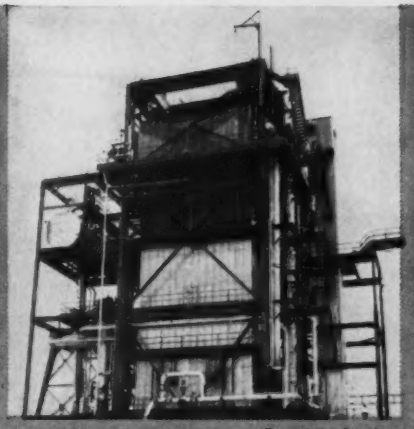
continuous expansion
at
Central Louisiana Electric
piped by Midwest



Coughlin Station

In 1948, Midwest fabricated and erected the piping for Central Louisiana Electric Company's Coughlin Station, Units 1 and 2. Total capacity for both units was 7,500 KW, operation conditions 625 pounds @ 825°.

Midwest continued to furnish piping for the station's four subsequent expansions, including a 100,000 KW unit in 1961, and for the first two units of the company's Teche station. Combined capacity of all units piped by Midwest was 270,000 KW.

Midwest's proven capabilities for quality fabrication and erection have resulted in "repeat business" like this from many major power companies.

The story of Midwest's coordinated fabrication-erection service is told in a 24-page illustrated brochure, POWER AND PROCESS PIPING. Write for your free copy today.

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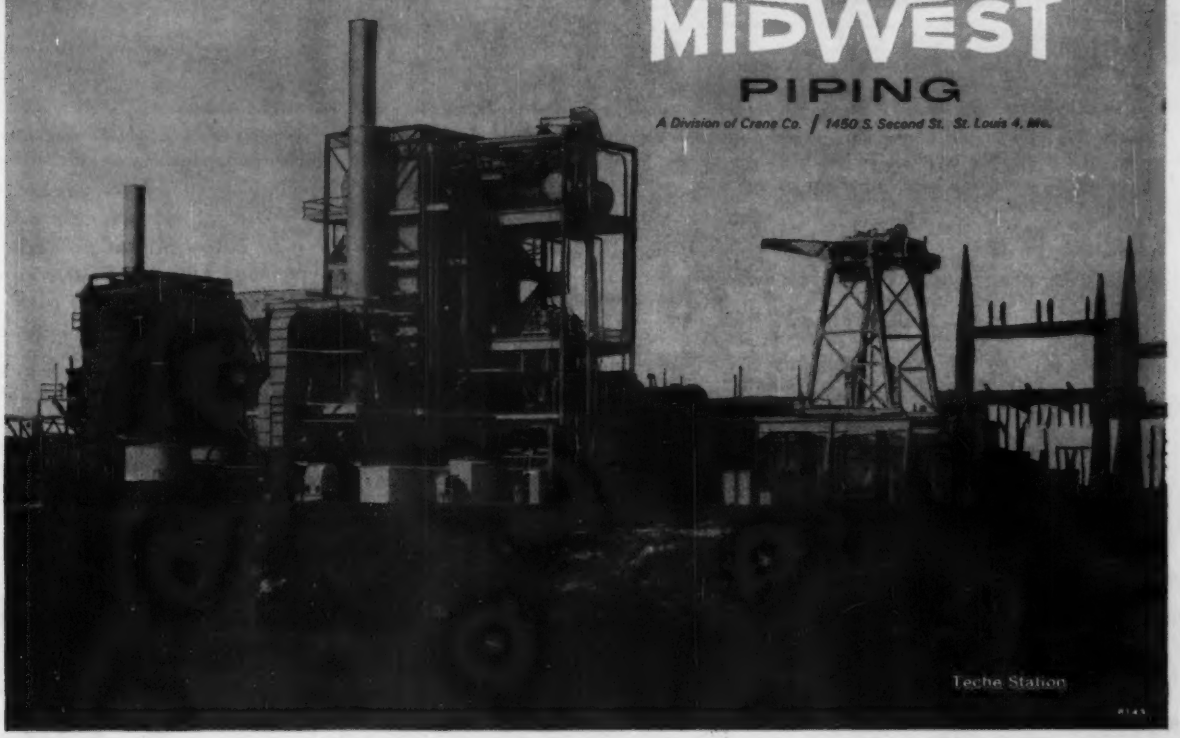
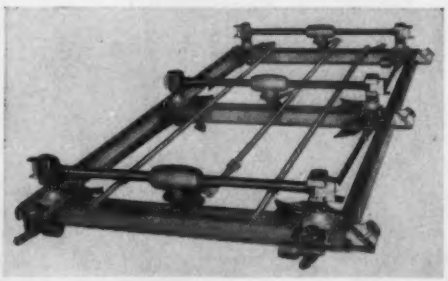
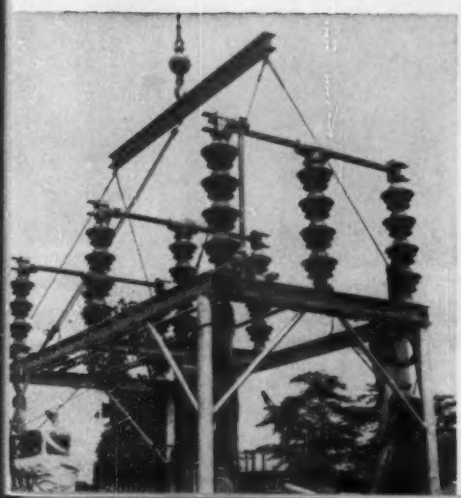


Teche Station

Above is a partial view of the Ravenswood Substation showing some of the switches in place on the aluminum stands. In all, there are 54 disconnect switch structures as well as a variety of structures for bus supports, lightning arresters, coupling capacitors and wave traps, cable potheads, and potential transformers.



Preassembled welded aluminum switch structure as it arrived from the factory. Switch bases are integral with frame. Grounding switches and their interphase rods were also factory installed in many cases.



The photograph at left shows the special sling used to lift the switch package into position on the leg sections. The columns for a typical stand were installed in approximately 10 minutes; insulators were installed in a little over an hour, and the switch lifted and bolted into position in less than 15 minutes.

RAVENSWOOD GOING UP...

A NEW CONCEPT IN SUBSTATION DESIGN AND CONSTRUCTION

Ravenswood transmission substation which serves Con Edison's big new generating plant along the East River in Long Island City, New York, is going up smoothly and quickly. One of the major factors contributing to the speed and ease of its erection is a bold new concept in substation design and construction: factory preassembly of switch structures.

The original idea for these packaged structures came about as a need voiced by Con Edison's engineers. Working with them on the project, Southern States' Structural Engineering Department conceived a practical design permitting much assembly work normally accomplished in the field to be done at the factory.

Ravenswood, the world's largest aluminum transmission substation, was the first practical application for this concept. When construction started, these compact, easily handled units were in the field ready for installation. They consisted of completely assembled welded aluminum frames with integral switch bases, interphase rods, and components of the switch mounted in position. By simply removing the switch live parts and reassembling with insulators, the packaged structures, with switches already adjusted, were ready for installation. In addition, factory fabricated aluminum stands further reduced the number of hours required to get a switch installed.

Some of the advantages of this approach are readily apparent. Contrast the handling required for these factory assembled switch structures to the conventional method of shipping all pole units separately. Further, in usual practice, all interphase rods, clevises, adjustable arms, grounding shunts, and numerous nuts and bolts are unassembled when they arrive at the job site. As construction engineers will confirm, a lot of valuable time is spent sorting and preparing such switches for mounting. And once the switches are in place on their stands, interphase rods have to be installed and the switch completely adjusted for proper opening and closing. (The packaged units require only a minor adjustment of tilting rings after the switch is installed.)

According to Con Edison, savings at Ravenswood are significant.

Although the use of aluminum structures and aluminum stands as employed on this station may not be practical in some areas and for some utilities, the principle involved may represent a real breakthrough in substation construction. For example, the basic idea could be easily applied with factory assembled, bolted steel sections for mounting on any type of stand whether aluminum, steel column, or conventional structure.

With labor costs skyrocketing, serious consideration should be given to the practicability of factory preassembly of switch structures for your next substation.

Why not discuss this new idea with your Southern States representative or contact us direct for additional information?

SOUTHERN STATES

HAMPTON, GEORGIA

IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO

If it's your responsibility...

Why Moloney?

MOLONEY ELECTRIC COMPANY / *Manufacturers of Transformers and Switchgear for Utilities, Industry, and Electron*

to select distribution transformer suppliers, then it's important you consider Moloney!

Because Moloney "Total Design" Transformers will give you efficient, customer satisfying performance.

Moloney's emphasis on "Total Design" transformer performance, so vital to your utility system, assures you that no one feature is stressed at the expense of another. Each new innovation must contribute to improvement in "Total Design".

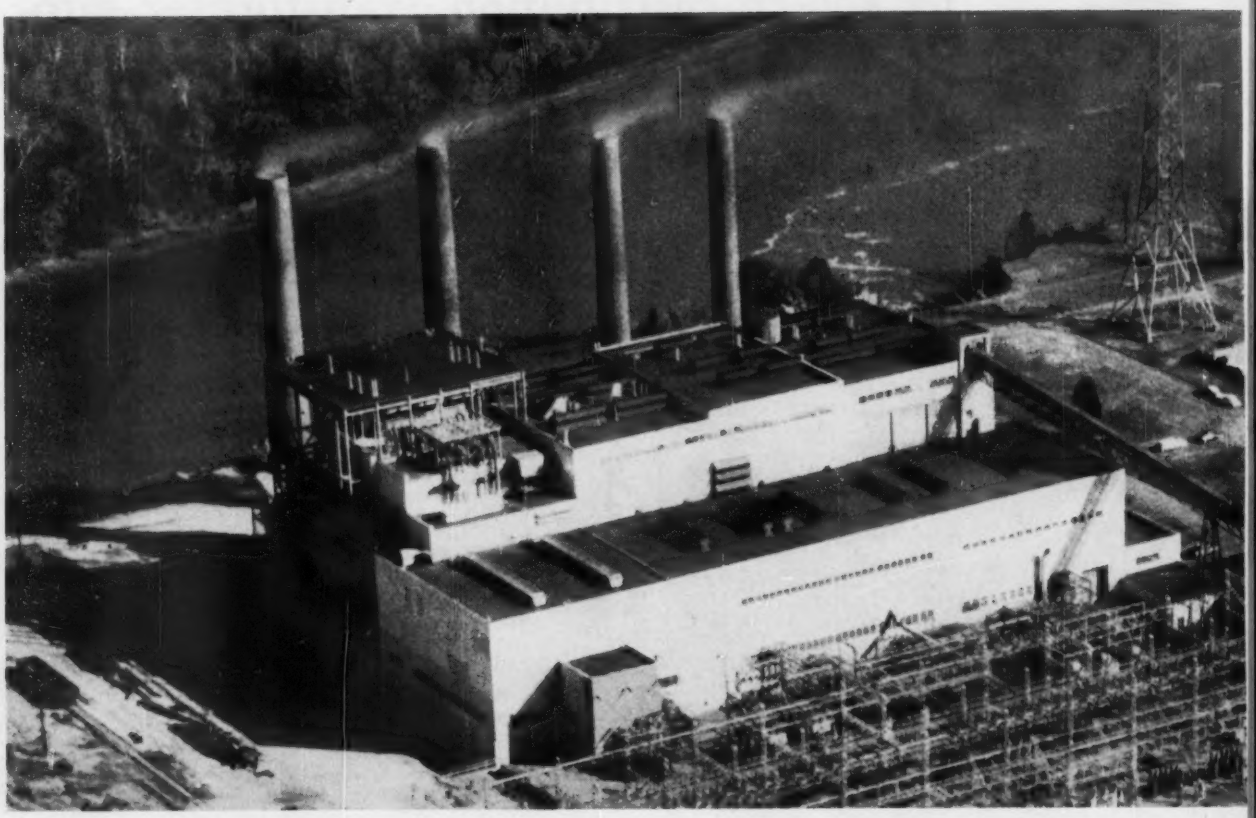
For example, the thermal operating efficiency of Moloney Transformers has been substantiated by the AIEE-NEMA Life Tests, in which Moloney has participated since their inception. To further improve the "Total Design", Moloney developed Duratherm, one of three high temperature insulating papers presently available, which give still greater thermal capability.

Investigate the "Total Design" transformers and see what they offer for your system.

Applications

MOLONEY ELECTRIC

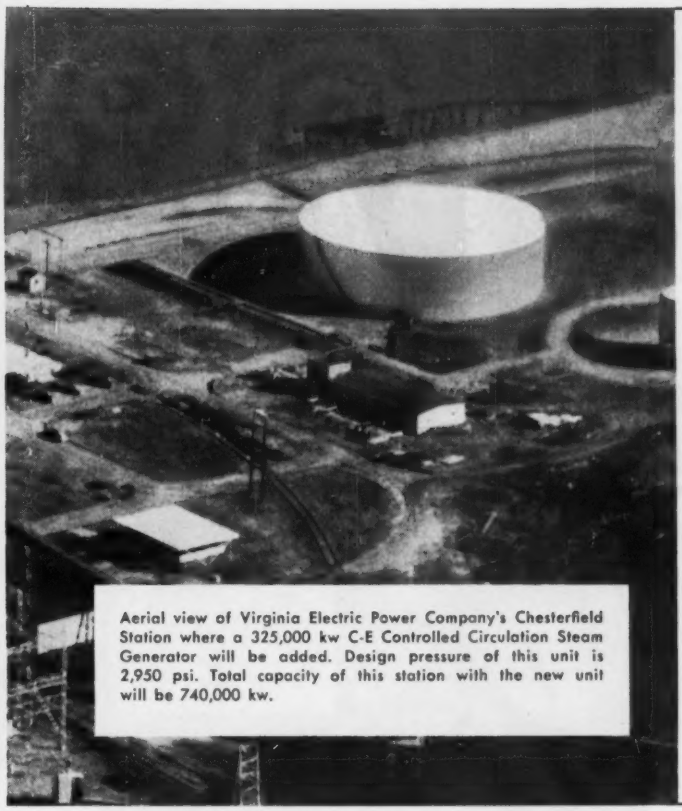
ME 61-25



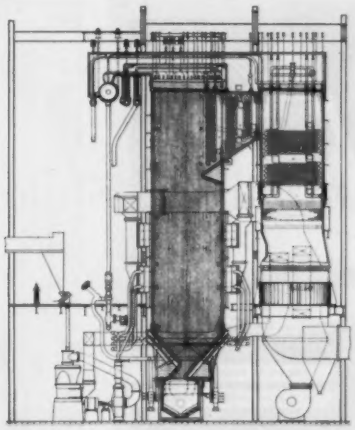
VEPCO's Chesterfield Station to get system's

Utility Power Stations which have C-E Controlled Circulation Steam Generators installed or on order:

Company	Station	Company	Station
Alabama Power Company	Barry	Houston Lighting & Power Company	Sam Bertron
Boston Edison Company	Mystic	Illinois Power Company	Hennepin
Carolina Power & Light Company	Cape Fear	Illinois Power Company	Vermilion
Carolina Power & Light Company	H. B. Robinson	Illinois Power Company	Wood River
Central Hudson Gas & Electric Corp.	Danskammer	Kansas Power & Light Company	Tecumseh
Central Illinois Public Service Company	Meredosia	Kansas Power & Light Company	Lawrence
Cincinnati Gas & Electric Company	Miami Fort	Kansas City Power & Light Company	Montrose
Cincinnati Gas & Electric Company	Walter C. Beckjord	Metropolitan Edison Company	Portland
Cleveland Electric Illuminating Co.	Ashtabula	Montaup Electric Company	Somerset
Cleveland Electric Illuminating Co.	Eastlake	New England Power Company	Brayton Point
Cleveland Electric Illuminating Co.	Lake Shore	Niagara Mohawk Power Corporation	Dunkirk
Commonwealth Edison Company	Will County	Niagara Mohawk Power Corporation	Charles R. Huntley
Commonwealth Edison Company	Crawford	Northern Indiana Public Service Company	Dean H. Mitchell
Commonwealth Edison Company	Fisk	Pennsylvania Electric Company	Seward
Commonwealth Edison Company	State Line	Pennsylvania Electric Company	Shawville
Commonwealth Edison Company	Waukegan	Pennsylvania Power & Light Company	Brunner Island
Commonwealth Edison Company	Joliet	Philadelphia Electric Company	Schuylkill
Connecticut Light & Power Company	Norwalk Harbor	Philadelphia Electric Company	Cromby
Consolidated Edison Co. of N. Y., Inc.	Astoria	Potomac Electric Power Company	Dickerson
Consolidated Edison Co. of N. Y., Inc.	Ravenswood	Potomac Electric Power Company	Potomac River
Consolidated Edison Co. of N. Y., Inc.	East River	Public Service Electric & Gas Company	Kearny
Consumers Power Company	John C. Weadock	Rochester Gas & Electric Corp.	Russell
Consumers Power Company	B. C. Cobb	Rochester Gas & Electric Corp.	Beebee
Consumers Power Company	Dan E. Karn	South Carolina Electric & Gas Company	Canadys
Consumers Power Company	James H. Campbell	South Carolina Electric & Gas Company	Silas C. McMeekin
Detroit Edison Company	St. Clair	Southern California Edison Company	Etiwanda
Detroit Edison Company	River Rouge	Southern California Edison Company	Alamitos
Duke Power Company	Allen	Tennessee Valley Authority	Widows Creek
Duke Power Company	Dan River	Tennessee Valley Authority	Gallatin
Duke Power Company	Riverbend	Tennessee Valley Authority	Kingston
Duke Power Company	Buck	Tennessee Valley Authority	John Sevier
Duke Power Company	Lee	Virginia Electric & Power Company	Yorktown
Duke Power Company	Marshall	Virginia Electric & Power Company	Possum Point
Florida Power & Light Company	Port Everglades	Virginia Electric & Power Company	Portsmouth
Georgia Power Company	McDonough	Virginia Electric & Power Company	Chesterfield
Gulf States Utilities Company	Sabine	West Penn Power Company	Mitchell
Houston Lighting & Power Company	T. H. Wharton	Wisconsin Electric Power Company	Oak Creek



Aerial view of Virginia Electric Power Company's Chesterfield Station where a 325,000 kw C-E Controlled Circulation Steam Generator will be added. Design pressure of this unit is 2,950 psi. Total capacity of this station with the new unit will be 740,000 kw.



Elevation of the first C-E Controlled Circulation unit placed in service at Chesterfield in 1952. This 100,000 kw unit produces 750,000 lbs of steam per hour.

Background of The Controlled Circulation Steam Generator

In 1942, the Montaup Electric Company installed a C-E Controlled Circulation Steam Generator in its Somerset, Mass., Station. Following years of extensive study and test at Somerset, the generator was offered as a fully developed design in 1950. Shortly thereafter, the Virginia Electric & Power Company ordered the first unit. It was installed at VEPCO's Chesterfield Station and serves a 100,000 kw turbine-generator. Stone & Webster Engineering Corporation, consulting engineers for the installation at Montaup, also served as consultants for the Chesterfield installation. Before year-end 1950, several other large utilities had placed orders and the trend to Controlled Circulation and higher pressures was soon underway.

10th Controlled Circulation Steam Generator

In 1950, the C-E Controlled Circulation Steam Generator was made available to the utility industry as a fully developed and proven design. The first unit, purchased by the Virginia Electric & Power Company, was installed in VEPCO's Chesterfield Station and was placed in service in November, 1952. This installation marked the beginning of a new era in steam power practice. Now, nine years later, the VEPCO System has seven Controlled Circulation units "on the line" in four of its seven generating stations, has two additional units under construction and, most recently, ordered its tenth unit which, like the first, will be installed at Chesterfield. The total capacity represented by these ten units is approximately 1,700,000 kilowatts.

As the list at left indicates, the acceptance accorded the C-E Controlled Circulation Steam Generator has been industry-wide. Not revealed by the list is the world-wide acceptance it has achieved. Today, Controlled Circulation units are in service or under construction for electric utility plants in Australia, Canada, England, France, Italy and Japan. Total world-wide Controlled Circulation capacity ordered to date — about 43,000,000 kilowatts. Capacities range from 75,000 kw to 1,000,000 kw.

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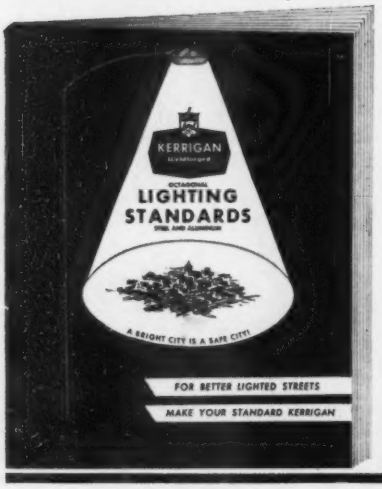
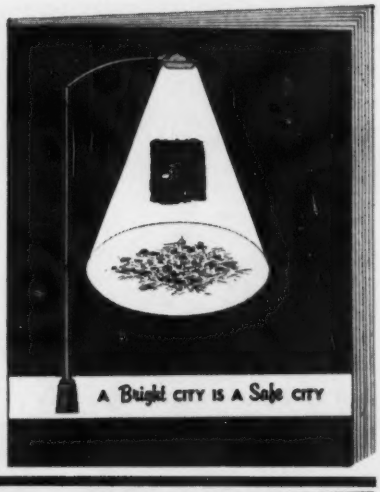
New York Offices: 200 Madison Avenue, New York 16, N. Y.

C-347

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE





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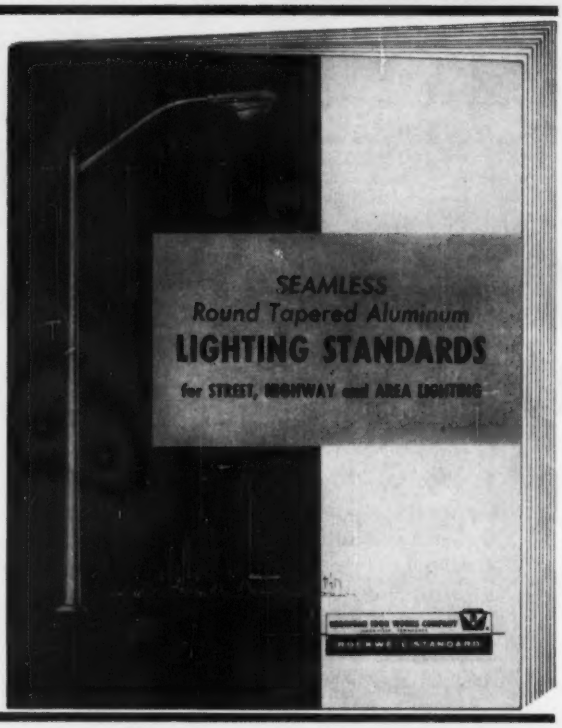
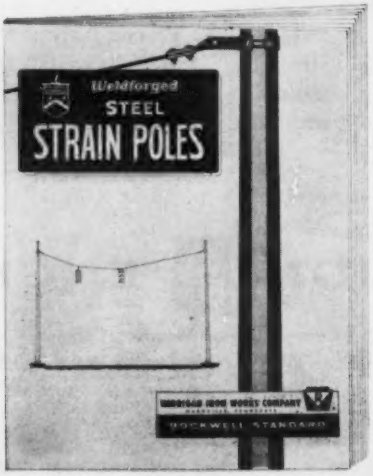




What can you do to stay ahead of distribution system

POW

POW

LL^{65} unoreg

No utility would consider using a 1923 line truck and equipment to install service to a total electric home! To keep pace, electric utilities must plan, plan, and plan ahead. No distribution system planning is modern enough for today's and tomorrow's loads if it does not include two of the most significant developments in distribution equipment in twenty years — the new Westinghouse LL-65 transformer, and the revolutionary Westinghouse UNOREG . . . the "head-end bucking" device that can save you thousands of dollars in voltage regulation costs. They make the perfect combination for distribution systems.

How can you benefit with the LL-65 and UNOREG? The LL-65, new 65°C rise transformer, permits higher loadings at reduced operating costs. It has the exclusive new INSULDUR insulation system to assure longer life. Combined with new Hi-Temp WEMCO-CH oil plus an improved copper to iron loss ratio, this insulation system permits higher loadings with fewer changeouts. UNOREG, a wholly new concept in voltage regulation, can save you thousands of dollars annually. It cuts costs ... reduces inventory ... steps up system performance ... and saves you up to 50% on capital investment alone. In addition, UNOREG provides you with the most flexible voltage regulation system possible. Whatever the plans for your distribution system, be sure they include the Westinghouse LL-65 and UNOREG ... two outstanding examples of Westinghouse long range product development for the electric utility industry. For the full exciting story on LL-65 and UNOREG, call your Westinghouse representative. **You can be sure ... if it's Westinghouse.**

Photography by Royal Kane, William Richards Associates, Inc. Litho in U.S.A.

J1-70958

TURBINES:

Shell reveals three ways that Turbo Oils help prevent oil breakdown, rust, sludge and foaming

Small quantities of air and water can work their way into any turbine lubrication system. These contaminants can accelerate oxidation of the oil.

Read how Shell scientists developed a specific formulation that counters this oxidation and brings you turbine lubricating oils with top performance records.

WHEN oxygen attacks turbine oil, it can form peroxides and organic acids. A chain of oxidation reactions begins. If the oil stability is inadequate, sludge can form.

Air entrained in the oil can aggravate oxidation. And it may cause foaming.

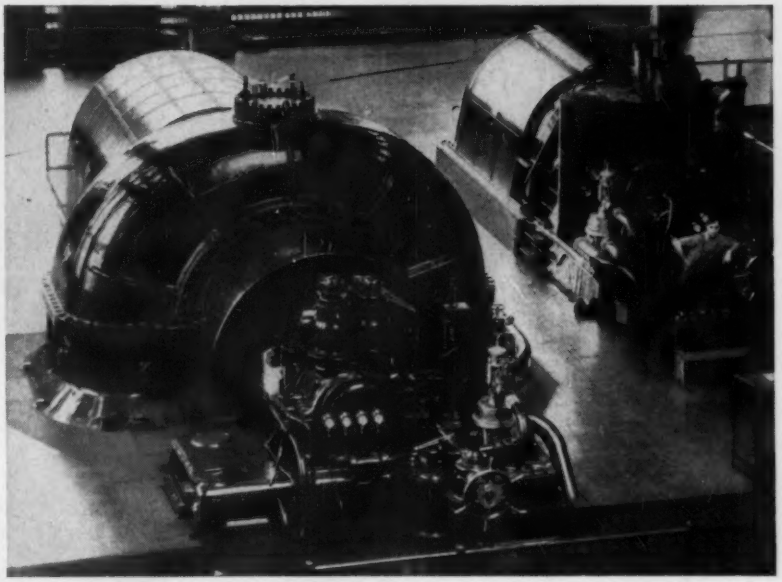
The oil may also be affected by water in the system. Laboratory tests have shown that water can greatly accelerate an oxidation process.

With Shell Turbo® Oil, Shell tackles these problems in three key ways:

1. *Shell carefully selects base oils for use as turbine lubricants,* then refines them to get the most effective response to Shell's special additives.

2. *Shell adds a powerful oxidation inhibitor to its precisely refined base oils.* This inhibitor helps prevent the chain of oxidation reactions caused by oxygen exposure at operating temperatures. It helps keep the oil in good condition, and lengthens its service life.

The result is that Shell Turbo Oils have proved themselves unusually stable over long service periods.



Shell Turbo Oils lubricate turbines with total rating of more than 17 million kw in the U. S. and Canada.

3. *Shell uses an outstanding rust inhibitor.* As a protective measure, Shell uses special additives that cover metallic surfaces with strongly adherent polar-type films.

These films are specially designed to help keep water from the metal surface.

In drastically accelerated laboratory tests, metals immersed in Shell Turbo Oils show outstanding anti-rust performance—even in the presence of sea water.

Ask your Shell Industrial Products Representative for facts on Shell Turbo Oils. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

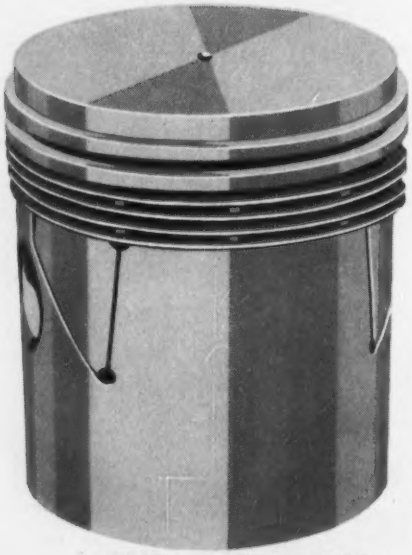
Memo to utilities

Ten turbines in the U.S. have been running on Shell Turbo Oil 27 *since 1938.*

In Canada, Shell Turbo Oils lubricate turbines generating more than half of all steam power produced.

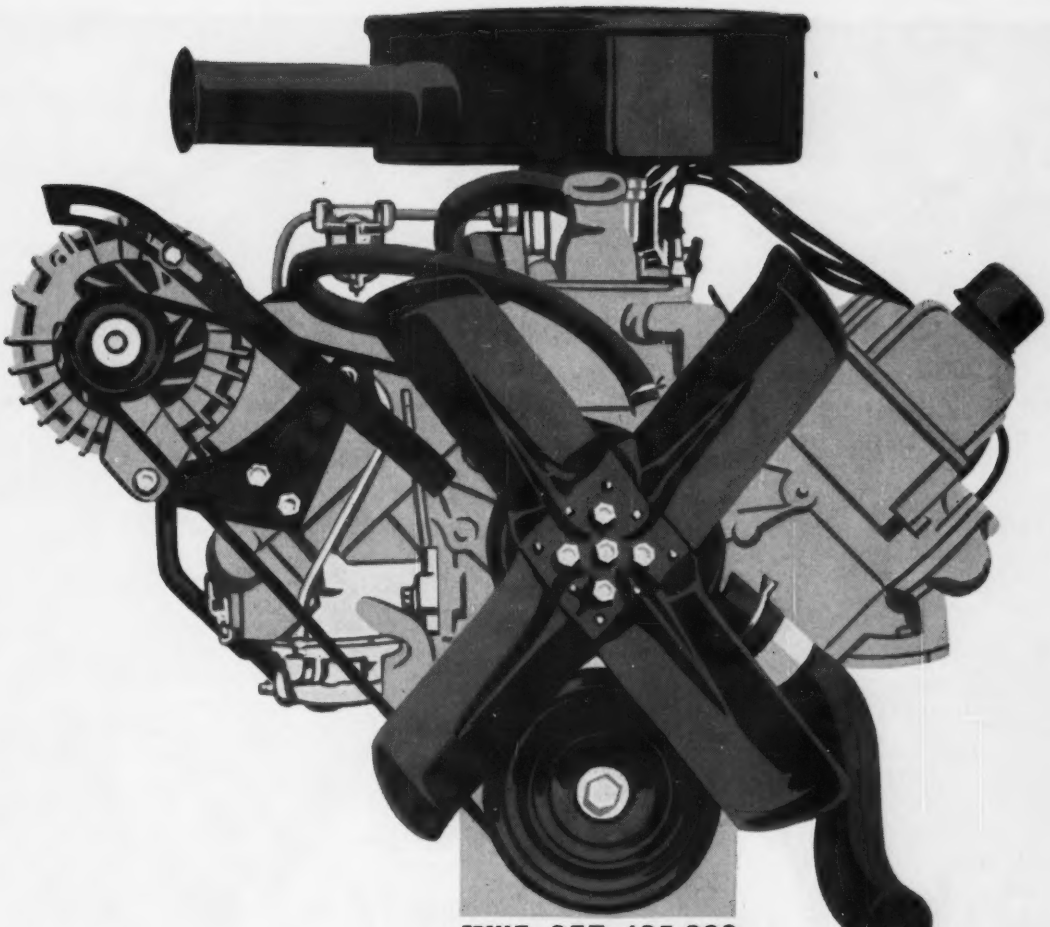
SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry



"ALL 102 OF OUR '48 DODGES HAVE GONE AN AVERAGE OF 90,000 MILES EACH WITHOUT A PISTON OR A RING BEING REPLACED."

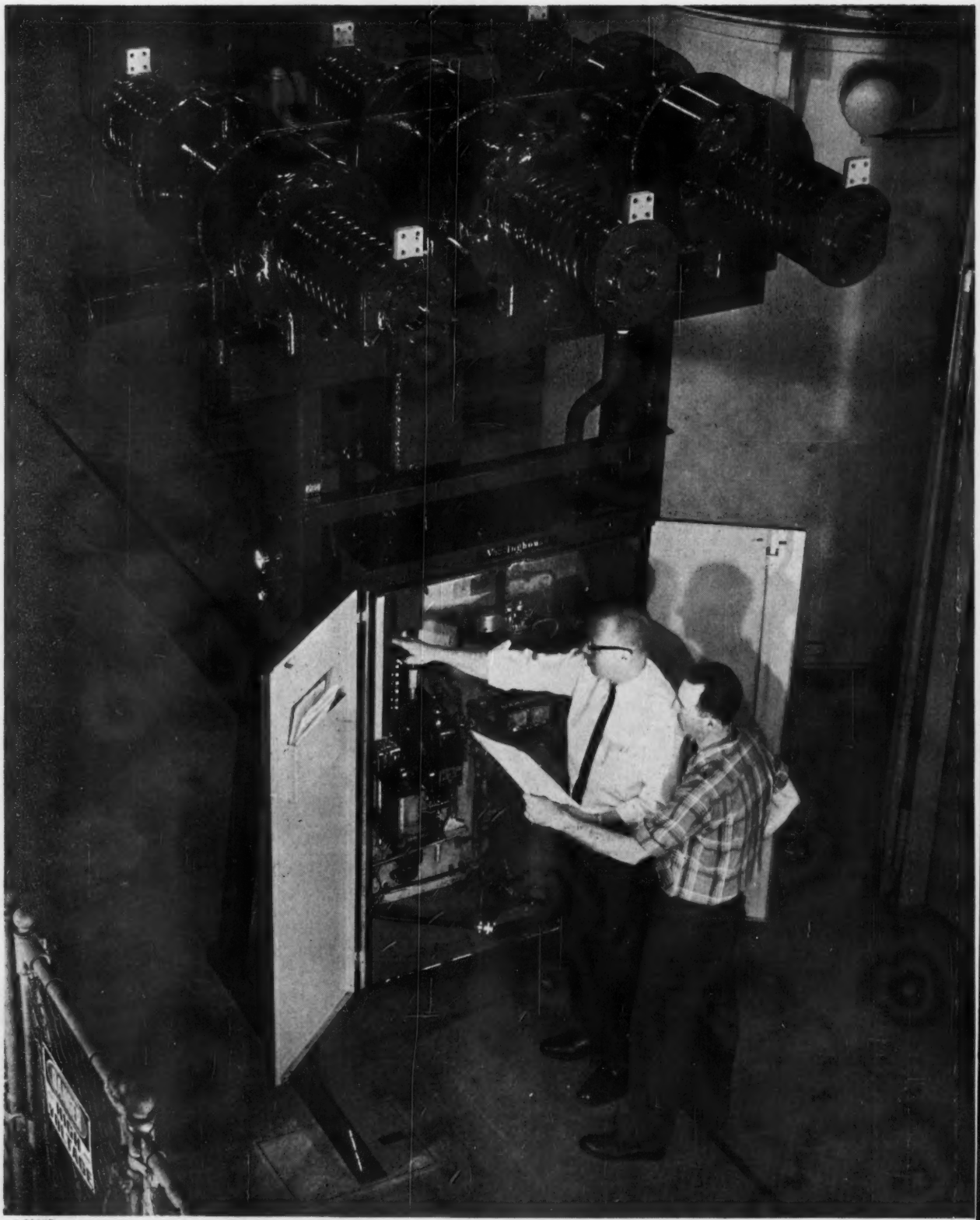
Capitol Dairy Co., Chicago, Illinois



"WE GET 125,000 TO 140,000 MILES FROM THE ENGINES IN OUR 8 DODGES BEFORE WE THINK OF REPLACING 'EM."

W. Hudman, Livestock Trucker,
Lubbock, Tex.

DODGE TRUCKS FOR 1962 have more than 50 engineering advances that make them tougher, more tight-fisted than ever. Included are new 2-speed axles, heavier transmissions, more economical diesel power, and new distributors and starters. See and drive the 1962 Dodges—America's only Job-Rated trucks—at your Dodge dealer's.



J-61015

Space-saving, design of SF_6 power circuit breaker places operating mechanism and cabinet below pole units in mounting frame, avoids interference with substation columns. Mechanically-linked pole units are closed pneumatically, opened by spring.

New:

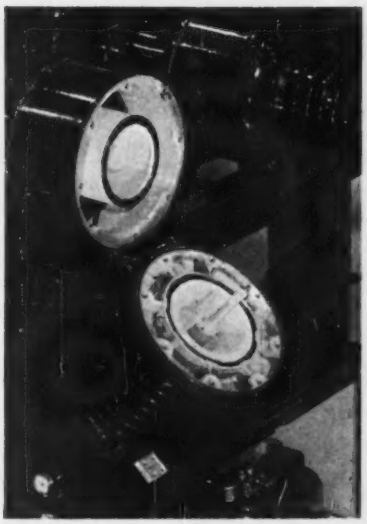
Compact 34.5 and 46kv SF_6 power circuit breakers are lighter, easier to maintain than conventional breakers

Now Westinghouse engineers have extended the revolutionary SF_6 power circuit breaker design to two new ratings—34.5 and 46 kv, 500 mva. This new breaker is a simple, low pressure device which does not require a gas compressor. Like the larger ratings introduced earlier, the new design combines the best features of oil and air blast breakers by taking full advantage of the unique properties of SF_6 gas: high dielectric recovery rate, exceptional dielectric strength and virtually unlimited life of SF_6 gas as an interrupting medium. Result is significant savings in space, foundation and maintenance requirements.

Simplicity of design made possible by the puffer-type interrupter is the key to greatly reduced maintenance. With only *one* set of contacts, *one* interrupter and *one* break per pole, adjustment is easy and there are few parts to wear out. In fact, indications are that these two new SF_6 power circuit breakers can be placed in service on a *five-year or longer maintenance basis.*

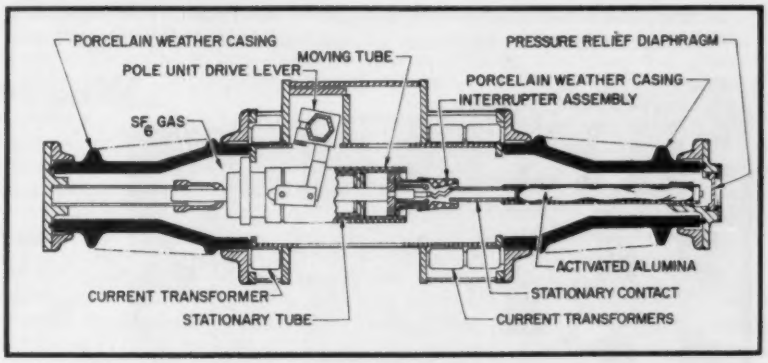
Your Westinghouse representative has complete technical details.

You can be sure . . . if it's Westinghouse



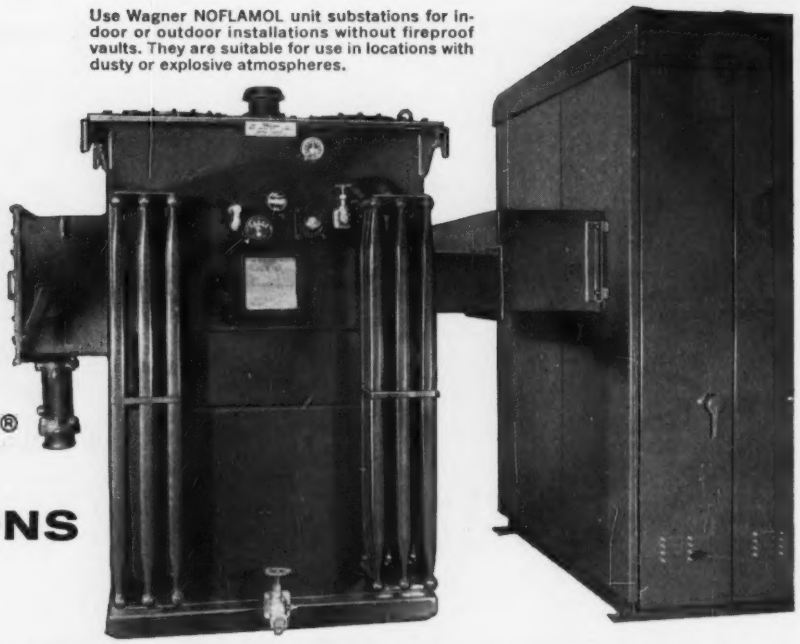
Hinged bushings provide easy access for inspection of contacts and current transformers. Two standard-accuracy current transformers may be mounted on one side of the interrupter and one transformer on the other side. This arrangement provides overlapping relaying protection if desired.

Heart of new, low-voltage design is puffer-type interrupter mechanism, shown here in cross section. Entire unit is filled with SF_6 gas at 45 psig. As breaker opens, cylinder moves to left. This action compresses the gas through an orifice to extinguish arc at tip extension of contact fingers.



Westinghouse

Use Wagner NOFLAMOL unit substations for indoor or outdoor installations without fireproof vaults. They are suitable for use in locations with dusty or explosive atmospheres.



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An uninterrupted flow of power . . . that's the important thing in buildings, be they sprawling single-story factories or high-rise offices. And that is what Wagner® unit substations provide.

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Wagner unit substations are built with transformers rated 112½ through 2000 kva, 3-phase, 60 cycle ratings with high voltages of 2400, 4160, 4800, 6900, 7200, 12000, 13200, or 13800 volts and low voltages of 240, 208Y/120, 480 or 480Y/277 volts.

Four types per NEMA standards are available: sealed dry-type; ventilated dry-type; oil-filled; and Noflamol (non-inflammable liquid-filled).

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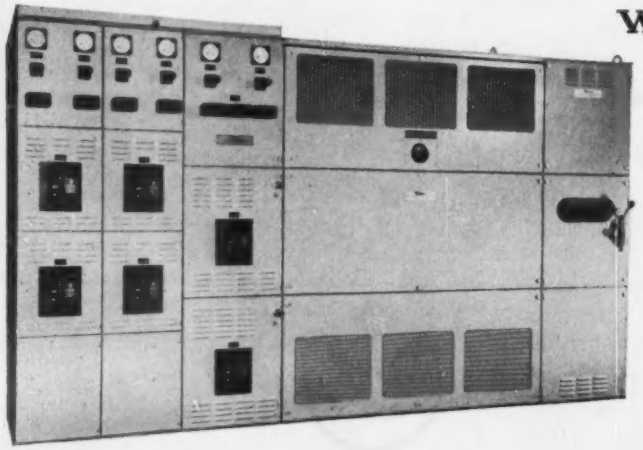

Your Wagner Sales Engineer

will be glad to help you plan any power distribution system. Get complete information on Wagner unit substations from him, or write us for Bulletin TU-152.

Use Wagner VENTILATED DRY-TYPE unit substations indoors. They perform efficiently in any reasonably dry, dust-free, well-ventilated location. Lightweight makes them ideal for use in multi-story buildings.

WT61-8A

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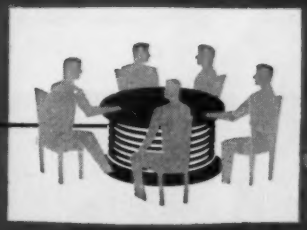
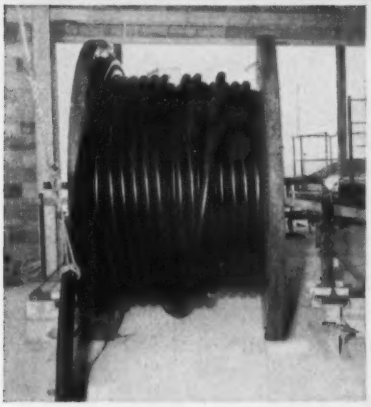
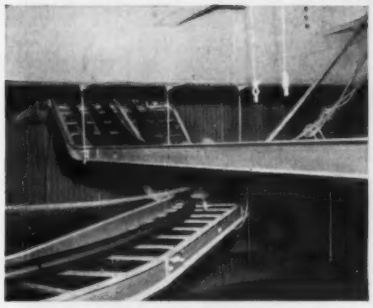
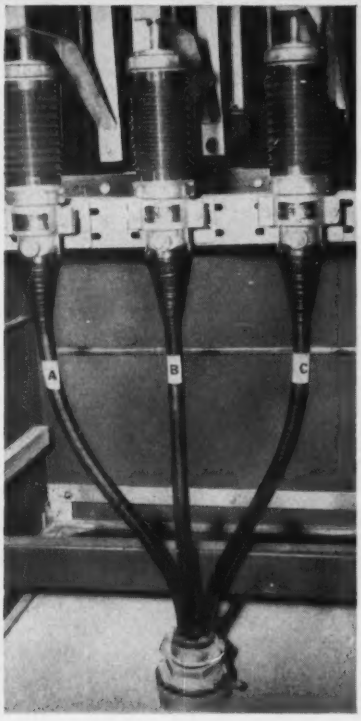
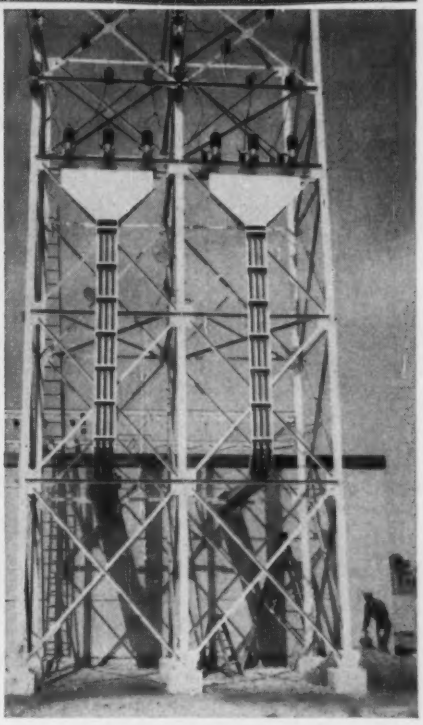
WIRE AND CABLE ROUND TABLE











Insulating and jacketing properties of ALATHON® allow innovations in 15 KV plant hookup

The pictures above were taken at a recent plant installation. They represent some construction and installation innovations made practical through the use of ALATHON polyethylene resins, as the insulation and jacket on the 15 KV cable shown.

The cables feeding from potheads in the tower to switchgear inside the building were completely pre-engineered and pre-assembled. In transit from the manufacturer, only the stiffening corners were removed to allow the bus to fold back upon itself. For installation, the corners were reassembled, and the entire feeder assembly installed in a minimum of time and expense.

Elsewhere in the plant, long lengths of the power cable were easily pulled through serpentine cable trays. For terminations, such as in the center picture, engineers designed new air-filled potheads instead of compound-filled.

To a large degree, these innovations depend upon the properties imparted by ALATHON. Because of its extremely low dielectric constant (2.28) and power factor (0.0002), insulation of ALATHON 3B, NC-10, is thoroughly reliable. Its outstanding resistance to corona, particularly at critical bend areas, is also of major importance.

As a jacketing material, high-molecular-weight ALATHON 1000, BK-30, offers trouble-free durability under a variety of severe environmental conditions. As a combination, the two compounds produce a cable of smaller dimensions with utmost reliability.

Whatever your specific cable construction, the use of ALATHON almost invariably results in a lighter, more flexible cable and one which is easier to install. A wide selection of specialized formulations of ALATHON is available to meet the electrical and environmental requirements of various installations. For more information, consult your wire and cable supplier, or write: Du Pont Company, Dept. EW 116, Room 2507A, Nemours Bldg., Wilmington 98, Del. *In Canada:* Du Pont of Canada Ltd., P.O. Box 660, Montreal, Que.

POLYCHEMICALS DEPARTMENT

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Better Things for Better Living . . . through Chemistry

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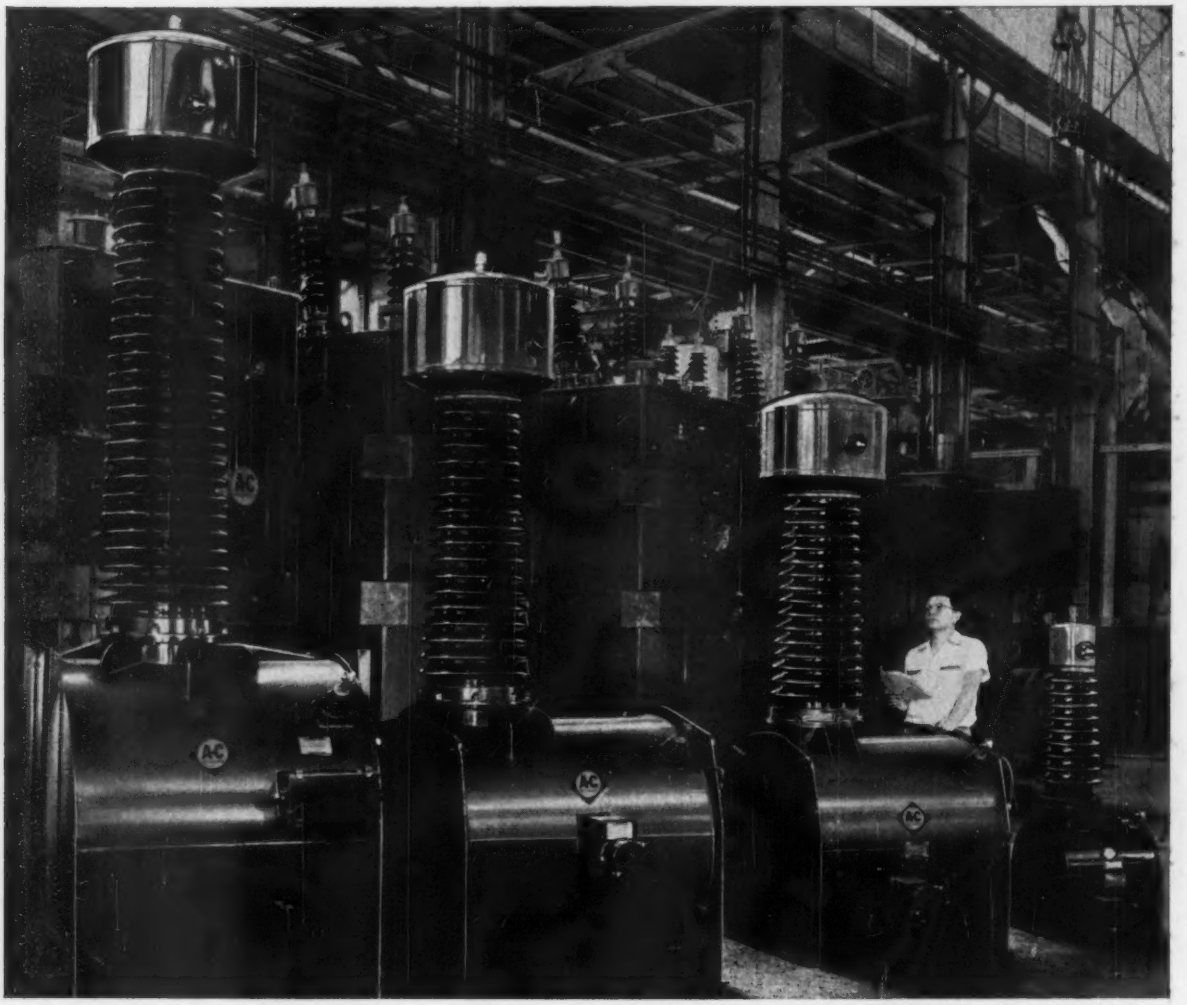


Outdoor potential transformers in 230, 161, 138, and 69-kv ratings.

A complete line

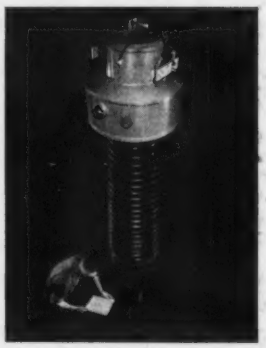
that meets your burden requirements

Allis-Chalmers is ready to serve your requirements with this complete line of corona-free oil-filled current and potential transformers from 25 through 345 kv.

In the Allis-Chalmers *corona-free* design, the insulation structure is arranged to keep electrical stresses at a minimum, thus eliminating *all* possibility of corona formation. By skillful designing of the insulation structure, ample oil passages exist which facilitate oil impregnation and assure free circulation of the oil. This open-type construction gives a decided bonus in thermal capacity.

Every unit receives the required ASA dielectric tests *plus* quality control impulse tests.

Contact your nearby Allis-Chalmers office for complete information on this line of high voltage instrument transformers, or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1 Wis.*



Outdoor current transformer, 900 kv BIL.

Editorial Comment

NOVEMBER 6, 1961

Presidential Spending Policy Applies to Federal Power

The President is showing real concern over the size of the fiscal 1962 administrative budget deficit, and the prospects for balancing the 1963 budget. He has formally notified his cabinet officers and other administrative heads that he expects full effort from each to reduce unnecessary spending.

We believe the wording of his policy statement to them is important. Below are excerpts we consider especially pertinent to federal power spending:

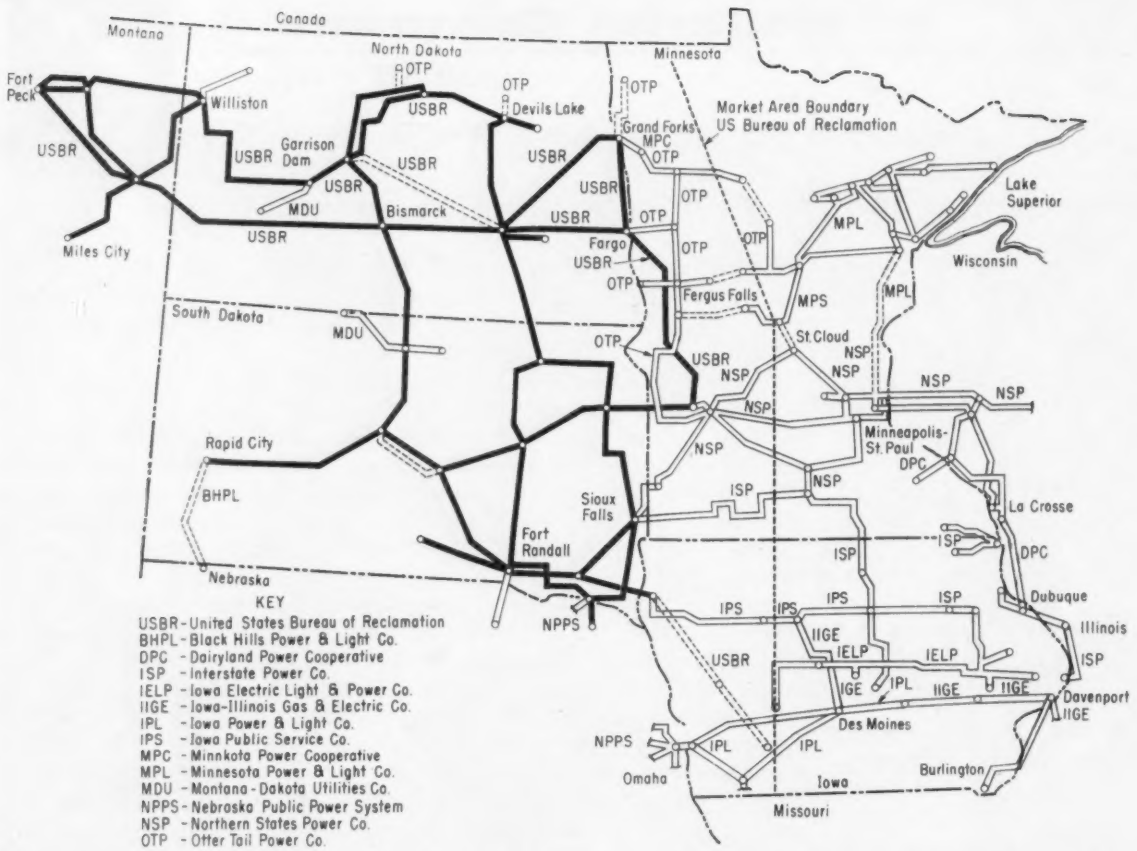
> "While the recent rises in estimates of expenditures and the deficit, therefore, are compatible with the sound fiscal and budget policies we have been following, they are further grounds for insistence on economy in executing government programs. This is the reason I have asked each of you to follow a most careful and frugal policy with respect to commitments and expenditures under the 1962 budget as enacted by Congress. The Congress has on many occasions made it clear that appropriations are only a ceiling, not a mandate to spend, and that department and agency heads are not required to spend every dollar appropriated. Accordingly, I have asked each of you to exercise the maximum care in scrutinizing all expenditures, tightening requirements, postponing the initiation of deferrable projects . . .
>
> "I am especially desirous that new programs or expansions of existing programs be undertaken with caution and deliberation, to make sure that sound criteria are used, careful plans are laid, and minimum funds are spent. I much prefer that obligational authority remain uncommitted where there is any doubt that expenditures would yield substantial returns to the national interests . . .
>
> "In view of the prospective gains in the economy, it is my intention to propose a balanced budget for (1963), barring extraordinary and unforeseen defense requirements. As you know, we can expect a substantial increase in revenues under existing tax laws in fiscal 1963, reflecting the economic recovery now taking place. However, it is already clear that expenditures for the military and other elements of our national security programs will necessarily rise next year. In these circumstances, it will plainly be necessary to defer or limit increases in many programs which in more normal times would be thoroughly desirable, and to shift present staffs and resources to the maximum extent from work of lower to work of higher priority. I will appreciate your cooperation in putting these policies into effect in planning the 1963 budget."

From where we sit, almost every program of federal transmission, and much of the generation, now "obligated," under study, or under consideration, would have to fall by the wayside under one or more of the criteria of this policy statement.

At once, the Upper Colorado federal transmission system comes to mind, with its $6-million appropriation for fiscal 1962 mushrooming ultimately to $134 million. Since Congress already has left the way open for Interior to negotiate further with the investor utilities who want to provide the facilities, it would seem that the Department's course must now be clear. And should not the same apply to the $16.5-million federal outlay slated for the Trinity River lines, where Pacific Gas & Electric has offered to handle this work?

Beyond this year, the new policy would seem to preclude re-introduction of the $95 million for Hanford generation, and to eliminate such dubious items as Burns Creek power and any electric co-op generation and transmission loans under the so-called "third" (security) criterion.

It will be interesting to watch actual performance of the agencies under the new spending policy.



USBR AND 14-UTILITY GROUP transmission lines intertwine in parts of Missouri Basin as of June, 1960. Solid lines represent major USBR transmission at 115 kv or above; open lines are those of utility group at 115 kv or above. Open dotted lines are important lines planned or under construction by either the Bureau of Reclamation or the utilities

Missouri Basin Pooling Proposed

Fourteen utilities ask Udall to consider firming up 650 Mw of federal hydro in eastern Missouri Basin through integration with local thermal plants

Hopes for an eastern Missouri Basin power pool were renewed recently. A proposal from 14 Midwest utilities to Interior Secretary Stewart Udall asked "integration of the federal hydro system on the Missouri River with the locally operated thermal systems in the area." Speaking for the group, Carl Bremicker, vice president, Northern States Power Co, asked that representatives from the Bureau of Reclamation be assigned to an existing working committee to continue the study.

This latest pooling proposal springs from a preliminary study which indicates "that integrated operation would completely firm the federal hydro system. It also shows that the firmed hydro system would have sufficient capability to serve all preference load in the present marketing area from the time the 468-Mw Big Bend project is completed until about 1970."

Capacity of the federal system in the eastern Missouri Basin will be 2,048 Mw when Big Bend comes on the line in 1966. Of this total, 1,200 Mw is reported as firm capacity. Looking forward to this time, two separate G&T cooperatives in the Missouri Basin have each asked for loans from REA to build 200-Mw thermal units by 1965 or 1966.

In his letter to Udall, Bremicker notes that "preliminary investigations show that the federal government is now having difficulty supplying all the preference load in the marketing area, as provided in the supplemental power program." He adds that "integrated operation would increase firm power capability of the federal system by about 650 Mw. Sale of this additional firm power would bring revenues to the government exceeding $10 million annually and could be accomplished with no added capital investment by the government."

Pointing up the significance of this 650 Mw of firmed power, one source told *Electrical World* that "we understand it will be impossible for the Bureau to serve its preference

load, under the supplemental power program. The federal system will be both short of energy and will have about a 300-Mw deficiency during the winter of 1962-63."

Assistant Interior Secretary Kenneth Holum asked to see copies of the preliminary study by the 14 utilities before he assigns any representatives to the committee. Holum added, "We will be prepared to meet with you immediately following our review of the studies. We suggest that the meeting be held at an early date. It is our recommendation that a meeting at a policy level should precede the proposed appointment of a technical committee."

Holum Includes Midwest

Holum also took it on himself to include the Mid-west Electric Consumers Assn (all preference customers) in the planning. He told Bremicker he had forwarded the Mid-west group, headquartered in Denver, copies of both Bremicker's letter to the Department and Holum's letter to Bremicker. Holum added, "It is our suggestion that representatives from this (Mid-west) organization, which represents the preference customers, be included in the meetings."

Further delineating the proposal, a spokesman for the 14 utilities said that operation of all generation and transmission in the eastern Missouri Basin as "one big system" would allow maximum advantage to be taken of hydro and steam generation. The engineering study "showed that such an operation is possible through integration of generation and transmission in the six-state area." The spokesman added that implementation of the proposal will not require any additional thermal capacity beyond that planned for in-service operation by 1962.

Enthusiasm Not Universal

Although the proposal suggests new hope for an eastern Missouri Basin pool, it was not greeted with enthusiasm by all utilities in the area. Andrew L. Freeman, manager of Minnkota Power Cooperative, said the plan would eliminate the need by 1966 for a 200-Mw unit in North Dakota (EW, Jan. 2, p 24) planned by Lignite Electric Power Cooperative, of which Minnkota is a member. He is quoted as saying, "It's very unlikely that this pool would build a plant here (in North Dakota) to use North Dakota lignite fuel."

Questioning the economics of firming up Bureau power, Freeman asked: "Can they provide power as cheaply as we could, or are they going to drive the cost of power up? That's what we're afraid of." To help implement Lignite's plans which include the 200-Mw unit, Lignite signed a statement of intent (EW, Feb. 27, p 131) with Northern States Power Co and Otter Tail Power Co, two of the 14 utilities proposing integration of federal hydro power.

And Lignite's plans for steam generation in North Dakota are similar to those of Basin Electric Power Cooperative, which also has proposed a 200-Mw unit and transmission (EW, May 22, p 62). Contacted by *Electrical World*, Basin president Arthur Jones said although he had not seen the proposal to Udall, he doubted "if we will change our plans, but rather we expect to pursue them. As an REA borrower we would expect that REA will look favorably on our proposal."

14 Utilities Involved

In addition to Northern States and Otter Tail, other utilities endorsing the proposal of integration are Black Hills Power & Light Co, Dairyland Power Cooperative, Interstate Power Co, Iowa Electric Light & Power Co, Iowa-Illinois Gas & Electric Co, Iowa Power & Light Co, Iowa Public Service Co, Iowa Southern Utilities, Minnesota Power & Light Co, Montana-Dakota Utilities, Northwestern Public Service Co, and Omaha Public Power District.

These 14 utilities, plus four federal agencies, two other public power districts, and 12 other G&T co-ops, belong to an informal organization known as the Eastern Missouri Basin Power Conference. Since its formation in 1957 (EW, Jan. 21, 1957, p 62), EMBPC has promoted pooling of electric systems in a six-state area. About two years ago, after studying a combined system with 6 million kw of capacity, EMBPC decided the area was too large to integrate in one giant step.

Rather, formation of about five smaller operating pools was considered a better plan. One such smaller pool, the Upper Mississippi Valley Power Pool, with about 3,100 Mw of capacity, has been formed (EW, Jan. 16, p 44).

CARL T. BREMICKER
Makes proposal to Udall

But a spokesman for the 14 utilities now sparking an eastern Missouri Basin pool hastened to add their action is outside the EMBPC organization, although it might be considered an outgrowth of studies made and data collected by EMBPC. Indications are that results of the preliminary engineering study of the 14-utility group will be presented to the engineering committee of EMBPC at a meeting early this month. It is this meeting to which Udall has been asked to send people from the Bureau of Reclamation.

KENNETH HOLUM
Wants more information

Administration Rushes NEAR Alarm Program

The Kennedy Administration is about ready to proceed—possibly within a month—on construction of the much-studied National Emergency Alarm Repeater (NEAR) system, to be attached to power systems.

The go-ahead will be given by the Pentagon, where the NEAR program was transferred on July 1. Specifications for home receivers and central station alarm transformers will be released in about a month by the Pentagon, according to current plans.

The home receivers should create about a $1-billion manufacturing market, while the central station transformers would create an additional $50 to $60-million market. Present equipment and appliance manufacturers would use the government-held patents and specification to build the units, and then bid to sell them to power systems.

Home units would cost between $5 and $10, while central station equipment might cost from $20,000 to $100,000 apiece.

The program, in going ahead this winter, would be stepped up by a couple of years. Earlier plans had called for a statewide test of the system in Michigan—about $70,000 is appropriated for this. But the Michigan test will be skipped on the assumption that the system has been developed adequately already.

Two studies are still holding up the construction go-ahead: **(1)** determination of the home receivers' signal voltage—somewhere in the vicinity of 1 v, burning about 3 w constantly; **(2)** network studies to determine the best location for central station transformers.

Another major switch in the NEAR planning involves payment for the system. Now, the Pentagon will call for all equipment to be paid for initially by the power systems. Individual customers may be required to repay the utilities for their own system for installation of the home receivers, but repayment would be handled on a company-by-company basis.

The utility payment decision replaces an earlier plan whereby the federal government would have provided $50 to $60 million to install central station equipment, and homeowners would have bought the receivers on the open market.

The Pentagon feels the present system is better because it gives more control to the program. Receivers now would be wired directly into the home electric circuit, rather than simply plugged in—thus providing more reliability. NEAR receivers, reportedly, would be engineered so that different regions, or even different groups of people within the same block, could be signalled separately.

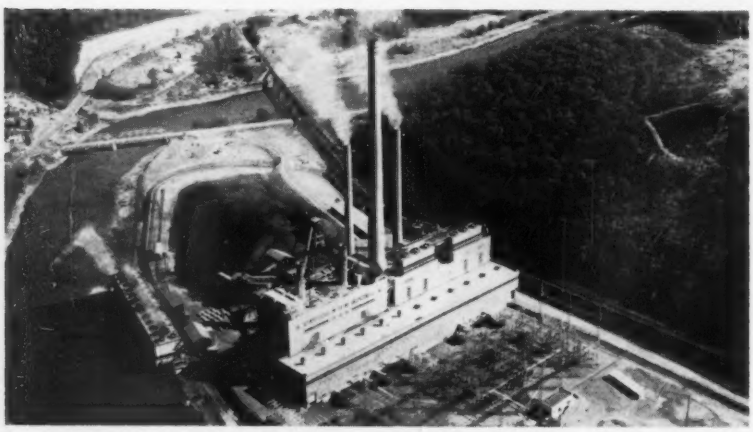
The $10 million voted by Congress for emergency planning would be spent by the Pentagon for other items, now that the decision has been reached to require utilities to install their own equipment. However, wiring between the central stations and regional headquarters of the North American Defense Command (NORAD), which has its headquarters near Colorado Springs, still must be planned, built, and financed.

A number of state governors and utility commissioners urged the Pentagon to go ahead quickly with the NEAR program. And some promised that utility costs for the program could be compensated for in rate adjustments.

Some small systems, which don't have the capital for the NEAR investment, are certain to get federal assistance for loans. Co-ops, of course, will find the Rural Electrification Administration sympathetic.

The question of ownership of facilities presented a number of problems. Federally owned equipment on utility property, means split responsibility.

The home receivers would have a sound "considerably worse than an electric alarm clock—something like a Navy warning system," and would use about 50 cents of power annually. Periodic, nationwide tests would be run on them. Their purpose: to wake up instantly the soundest sleeper, so that he could turn on his radio—Conelrad, if necessary—to learn of the emergency.



Tall Penelec Chimney Topped Out

Topping out ceremonies were recently held for a 630-ft reinforced concrete chimney, reported to be the largest in the Eastern states, at Pennsylvania Electric Co's Shawville Station (above).

The new stack will replace two stacks, each 200 ft, now serving two boilers. Two other 300-ft chimneys will remain in place. The chimney has walls 3 ft thick at the bottom and 8 in. thick at the top. Top diameter is 19 ft; bottom diameter is 37½ ft.

Dominy Plans to Build Upper Colorado Lines

Local systems must offer compelling alternatives beyond just wheeling agreements, Reclamation Commissioner warns

The Bureau of Reclamation is planning to build all the recently contested major transmission lines for the Upper Colorado project, unless some local power systems offer some very compelling alternatives, Reclamation Commissioner Floyd Dominy told *Electrical World* last week. And almost certainly these offers would have to include power exchanges to firm up Bureau power — not just wheeling — Dominy emphasized.

Dominy pointed out why the Bureau feels so jealous of the big power lines: With only one or two exceptions, the controversial lines are all "integrating" lines as well as marketing lines. They permit the Bureau to tie together not only its Colorado power projects (Glen Canyon, Curecanti, Flaming Gorge), but also the Lower Colorado system (Hoover-Parker-Davis), the Missouri Basin project, and even the small Rio Grande system as well.

So, when Interior Secretary Stewart Udall recently seemed to cloud the issue of lines, by referring to the contested lines as "backbone" instead of limiting the "backbone" reference to the few lines between the three Colorado power dams, the fuzziness was not semantics. It was a difference in concept over the broadness of the Bureau's power planning. Since "backbone" was first used in reference to integrating lines for the limited Colorado project concept, it has been changed so it can be applied on a broader scale to integrate the project with other Bureau systems.

The term, logically, can under this definition be used to cover all but one or two of the lines: these would be 138-kv lines in Utah northward from Glen Canyon Dam, and also, possibly, the 230-kv circuit southeastward from Four Corners to Albuquerque. The first of these admittedly would be only to serve preference markets, and therefore doesn't meet the Bureau's standards as "integrating" or "backbone." The other would "integrate" the Upper Colorado system with the Bureau's Rio Grande system, but not enough power would be involved to make this as significant to the Bureau as other lines.

In other words, if any utilities have a chance to build part of the Bureau's now-authorized system, they probably would be restricted to one of these two lines. However, Dominy is interested in more than just alternative wheeling plans to offset Bureau construction. He's interested in interconnecting with other systems—with firming up Bureau power by interconnecting.

Dominy admitted that he might be willing to enter into some short-term wheeling contracts for Bureau power along the proposed "yardstick" routes. This would have the advantage of putting off construction of full transmission capacity along some lines until predicted loads have built up to the point where the lines could be economically justified.

An earlier interview with Dominy took place in Salt Lake City on the Upper Colorado lines. Here are some key points:

Question—Have you tried to set up any meetings at all with private people concerning the wheeling of Colorado River power?

Dominy—No, and I will not personally attempt to set up any such meetings, because of the technical aspects . . . they must necessarily be carried out in the field under the direction of my regional director, Frank Clinton. . . .

'. . . And We Are Proceeding . . .'

Question—Has there been any determination made about the so-called backbone power lines involved in the system?

Dominy—Why, yes, I think the determination has been made, the Congress appropriated the funds . . . Secretary Udall has released a statement that we would proceed . . . and we are proceeding . . . survey and design of the lines involved in that interconnection backbone grid system is in effect getting under way.

Question—There will be no decision then as to exactly which lines will be involved until the survey is completed?

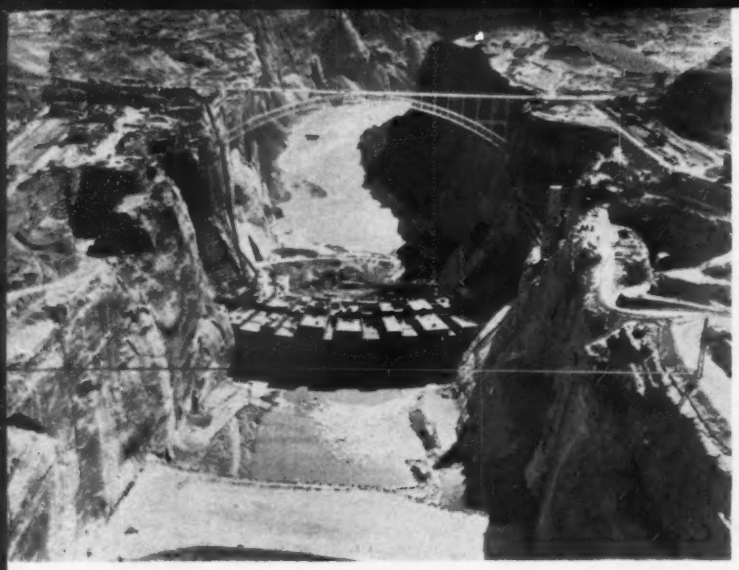
Dominy—Well, as far as the decision on the main backbone system is concerned, I consider that that has been made, and that, unless some very unusual unforeseen circumstances arise between now and the time we actually award (construction) contracts, we expect to award contracts based on these engineering surveys and designs that are now under way . . . the matter that is yet to be finalized is perhaps the timing of construction.

Question—There has been some talk lately—political discussion—in regard to Secretary Udall's announcement . . . on negotiations for the grids and the connections and utilization where possible of private power. Sen (Wallace) Bennett (R-Utah) has said that Secretary Udall has reversed himself on previous statements. Have you noticed any inconsistencies?

Dominy—No, I have not. I read the transcript of the press conference which he held in Washington (EW, Oct. 16, p 24-25).

Dominy said he was in agreement with the general tenor of the Secretary's thinking. Dominy told *Electrical World* that he thought the misunderstandings arising from Udall's remarks at the conference may have been due to the phrasing of questions on the Upper Colorado lines.

FLOYD DOMINY



Kennedy Shaves Power Spending By $37 Million

GLEN CANYON DAM, shown under construction, is one project on which work continues in fiscal 1962

President Kennedy gave evidence recently that he may be embarking on an economy drive within the Administration. He told cabinet officers to hold down unnecessary spending, both during the present fiscal year and in planning for the coming fiscal 1963 budget. President Kennedy added that he would try for a balanced budget in fiscal 1963, "barring extraordinary and unforeseen defense requirements."

But the President, in a review of his 1962 budget, released figures showing that the Administration's spending will be considerably above fiscal 1961, which ended last June 30. He plans to spend $2.119 billion on all natural resource activities during the present fiscal year—more than the $2.008 billion spent in fiscal 1961 and almost double the modern low point for resources spending of $1.105 billion in 1956.

Congress actually gave the Administration $2.156 billion to spend on resources, but President Kennedy plans to spend about $37 million less than this in the present fiscal year—some of it through savings, some of it put off for now.

At the bottom of the page is President Kennedy's estimate on how federal power agencies plan to spend money during fiscal 1962. The first figure is what was actually spent in fiscal 1961, the second figure is what Kennedy estimates will be spent in fiscal 1962; the third figure is the amount of new money appropriated for fiscal 1962.

Interior Secretary Stewart Udall also has given details of how he will spend $271.5 million for Bureau of Reclamation construction.

Here's a rundown of plans:

• Central Valley Project: Trinity Dam will be completed, while work will continue on the Trinity, Spring Creek and Clear Creek power plants. Work will be continued on transmission lines from these plants as far as Cottonwood.

• Colorado River Project: Work will continue on the Glen Canyon and Flaming Gorge dams and power plants. Specifications will be completed and a contract awarded to start work on the Curecanti Project's Blue Mesa dam and power plant, while design and specification details will continue to be developed for another Curecanti dam and power plant at Morrow Point.

• Colorado Transmission Lines: Work will continue on the Flaming Gorge-Oak Creek, Glen Canyon-Curecanti and Gunnison-Blue Mesa-Curecanti - Montrose lines. Construction is set to be started on the Vernal - Springville - Hyrum, Craig-Sinclair, Glen Canyon - Pinnacle Peak-Mesa, Shiprock-Albuquerque, Curecanti-Midway and Curecanti-Craig lines. Pre-construction work will begin on the Midway-Limon and Glen Canyon-Centerfield-Fillmore-St. George lines. Survey contracts already have been awarded to private firms for the major Colorado lines.

• Missouri Basin Transmission Lines: Pre-construction work will begin on the Yellowtail-Dawson county line; construction will begin on the Winner - Mission - Martin, Oahe-Eagle Butte-Maurine-Newell-Rapid City lines; construction will be continued on the Garrison-Jamestown, Oahe-Fort Thompson, Fort Thompson-Huron-Watertown, Fort Randall-Granite Falls, Fort Randall-Oahe, Oahe-Midland, Sioux City-Dennison-Creston and Sioux City-Spencer lines; construction will be completed on the Garrison-Minot-Rugby, Jamestown-Fargo 2, Jamestown-Grand Forks and Cheyenne-Pine Bluff-Sidney lines.

Federal Spending on Power Projects

(millions of dollars)

Power Agency	1961 (actual spending)	1962 (actual spending)	1962 (appropriation)
Rural Electrification Administration	301	330	418
Corps of Engineers	926	958	971
Bureau of Reclamation	266	280	278
Interior Power Agencies (SWPA, SEPA, Bonneville)	43	39	41
Tennessee Valley Authority	39	78	38
Federal Power Commission	8	9	9

One-Company Operation Urged

Iowa utilities' consolidation proposed to NAEC as counterattack on federal power's continuing expansionism

"One-company" operation of all Iowa utilities to meet public power's competition was urged on the 14th annual management conference of Iowa utilities in Des Moines, Iowa.

Federal transmission lines will be built wherever possible to link federal hydro projects into a country-wide federal power grid, warned Arthur Barnett, National Assn of Electric Companies.

Federal atomic power plants, if congressional authorization can be obtained, will be tied into this grid, he continued, adding that cooperative thermal plants will be promoted under liberalized generation and transmission loan criteria and tied into the federal grid.

US Hydro Increasing

The rate of building federal hydro projects will be increased, while investor-owned companies can expect few, if any, licensed authorizations for large hydro plants, Barnett continued. He noted that the criteria for judging the feasibility of federal multi-purpose hydro projects will be liberalized and federal pump-storage projects eventually built.

REA Is Broadening

Finally, the broadening of REA activities into area redevelopment will bring industrial load to REA-borrower systems, he said.

Barnett characterized the transmission lines for the Upper Colorado River Storage project as a case where the Administration could have struck a blow for cooperation between private industry and the federal government, but chose to do otherwise.

The electrical industry can stop the present move to public power, said Milton L. Kapp, Interstate Power Co.

But from top management down, too many people think "it can't happen to us," he said. He urged that through trade publications, national agencies, and advertising programs, the industry tell the public who actually owns the investor-owned utilities. Politicians want the public to believe that "Wall Street or someone in Boston" owns them, Kapp said.

Public relations in the utility industry should stand equally with engineering, accounting, and sales, said Edwin Vennard, managing director, EEI. Chief executives should determine goals, set up organization, employ the people, and measure the performance in public relations.

This job "is going to take more people and more money," Vennard said, "but the benefits of good employee morale, job satisfaction and efficiency, and good public attitude justify the cost."

Cites Proposals

Having studied six plans for expansion of Iowa utilities through 1980, he can now "lend a willing ear to ideas," said N. Bernard Gussett, Iowa Power & Light Co. He referred to these proposals:

1. A power pool with 10 to 15% reserve to serve any combination of loads. By 1962, the Iowa Power Pool should approach the 15% reserve mark.

2. With peaking units, increased efficiency, and a lowered cost of smaller firm-power units, the pool could reduce minimum reserve capacity to 5% and maximum reserve to less than 10%.

3. A move toward the installation of large units on not more than four plants sites.

4. The principle of three supply areas (east, central, and west).

5. Planning for all Iowa companies on a "one-company" basis.

This last proposal, he said, should bring savings exceeding those of minimum pooling.

Iowa utility executives will not overlook joint construction of transmission and generation, high-debt financing of major units, participation with other organizations for economies and prevention of wasteful investment, and pools made up

(Continued on page 80)

Planning for Iowa's Electrical Future, 1961-1980

Type of Plan	Total Capacity, Mw*	Number of Machines*	Average Unit Size, Mw*
A	2,723	20	137
B	2,723	17	160
C	2,698	14	192
D	3,248	15	217
E	3,550	16	222
F	2,998	14	214

Plan A: Five companies in Iowa Power Pool would install generation at principal load centers to serve their own loads in each load center.

Plan B: Five companies would treat respective areas as a single load area, using transmission to tie generation to load.

Plan C: Five companies would operate as "one-company" system having three load areas, generally, the eastern, central, and western portions of Iowa.

Plan D: Same as Plan C but including the five G&T cooperatives in Iowa.

Plan E: Same as Plan D but including the municipal systems in Iowa.

Plan F: Same as Plan C but including only Corn Belt Power Cooperative.

*Includes existing capacity and machines

Unify Electric Space Heating Selling,

Competition of gas is serious, Megley warns ECNE; bond market seen worsening; Aiken predicts more regulation

Concerted action in selling electric space heating was urged on the fifth annual convention of Electric Council of New England in Boston, Mass.

James W. Megley, Boston Edison Co, said that unity among gas interests is making gas a serious competitor. For both energy industries, "air conditioning load, including heating and cooling, becomes the highly prized main objective. The cooling component is the pivotal load for gas, space heating for electricity, he said.

Most electric loads in the past have had a high degree of uniformity, regardless of geography or climate, but the space heating load pattern is almost singularly a function of climatic conditions. This means the utility must exercise caution with regard to space heating, especially in connection with varying local temperatures and the contribution to heating from other electricity consumers, such as high-level lighting.

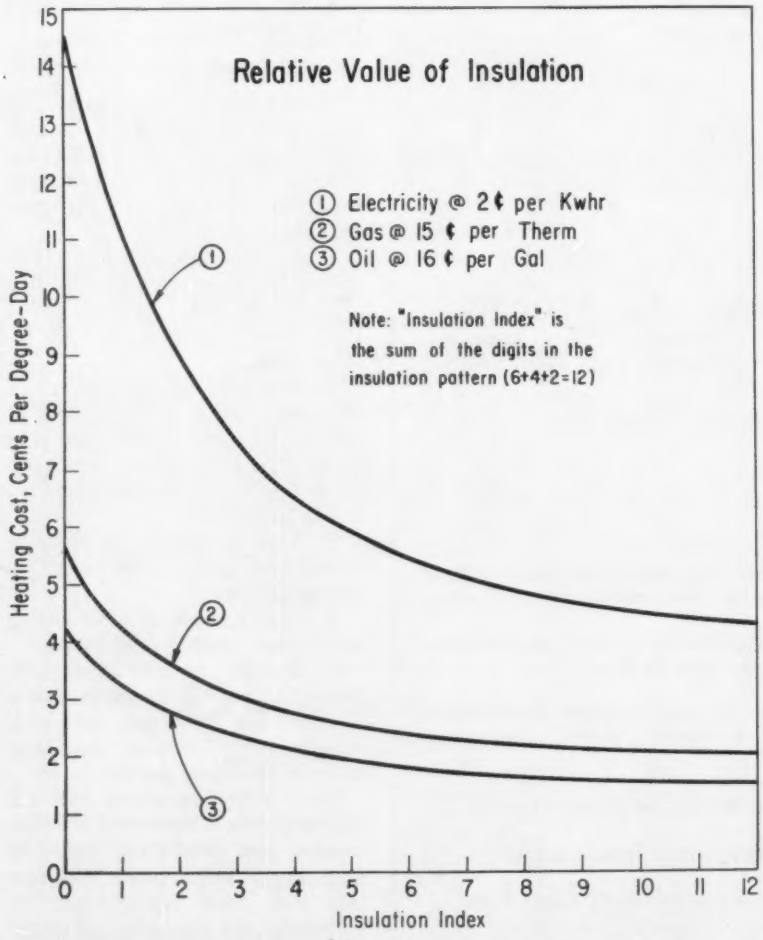
"Many an eyebrow has been raised upon comparing the cost of heating a heavily insulated house with that for heating the same house with less insulation," said Megley. Yet the comparison is realistic.

The slope of the electric cost curve at an insulation index of 12 is about the same as that for gas and oil at an index of around 4 to 5. It follows that an increase of insulation index from 4 to 12 can be justified for electric heating, the point of diminishing return being at index of 4 for gas and oil.

He said that heat from thermal storage can be delivered at substantially lower cost than energy to other electric space heating systems. Unfortunately, this system, with plain water as the most versatile storage medium available, lends itself to multiplicity of designs.

"Standardization on a single design concept offers tremendously attractive advantages. Here again is need for singleness of approach, at least on a regional basis," he said.

In calling for an organizational framework leading to singleness of approach, Megley said, "This function I believe ECNE is admirably adapted to perform."


Relative Value of Insulation
① Electricity @ 2¢ per Kwhr
② Gas @ 15 ¢ per Therm
③ Oil @ 16 ¢ per Gal
Note: "Insulation Index" is the sum of the digits in the insulation pattern (6+4+2=12)
Heating Cost, Cents Per Degree-Day
Insulation Index
0 1 2 3 4 5 6 7 8 9 10 11 12
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

HOUSE INSULATION is evaluated with regard to heat installation, curve's flattening denoting dropping value of any increase in insulation for heat purposes

Bonds May Slip

A warning that electric utility bonds may lose their favored position among institutional investors was sounded by Sherwin C. Badger, New England Mutual Life Insurance Co. Pension funds, he said, have leaned toward electric utility bonds, but as they grow larger and become more sophisticated, could be lured away to other bonds with higher yields.

Insurance companies tend to stay away from utility bonds because of the utilities' propensity to recall and refund high-coupon issues during low-interest periods, he continued. This has made them regard utility bonds as "lousy merchandise" and their premiums as not compensatory. The insurance companies, having been through this twice in recent history, stay away from the open market where the SEC has influence, but still consider privately negotiated offerings when recall conditions are arranged properly.

Institutional investors, Badger added, control a very large block of

New Englanders Told

new money, about $10 billion annually.

He cited the succumbing of common-stock investors recently to "the cult of growth," the accenting of capital appreciation. This has meant the driving of many stocks to unduly high price-to-earnings ratios, he said. In one sense, many New England utilities ought to be glad they have not shared in this boom. Nevertheless, they retain the obligation of convincing their regulatory agencies to grant treatment for redirecting investors, including institutional investors, attention to higher-growth utilities. New England companies, Badger said, have the reputation among professional investors for the lowest rate of return and the poorest regulatory climate, circumstances which in time must be corrected.

James L. Hayes, Duquesne University, covered the evaluation of managers' performance. Speaking of top and next-echelon managers, he admonished: "If you don't tell them what you want done, you can't measure what they do."

Guidance Needed

Creativity, initiative by the subordinate, has its place, but the subordinate still needs the manager's guide lines so that he does not create in the wrong direction.

Hayes cited as managerial weakness the tendency to revert to vocational activity instead of getting others to do it. Besides delegation of functions, planning is a major duty by which managers can be measured. The good planner not only can be absent for a week or more without performance suffering in his department, but he plans for ten years or more ahead. He divorces himself from the idea that "by then I won't be here" because his planning is for the organization, not his own future.

In setting goals, the manager, said Hayes, ought to encourage subordinates' participation in deciding on them. This gives them more incentive to attain those goals than were they asked to attain aims set down by fiat.

Management suffers today from the usurpation of line authority by staff and the abdication of line authority by line. Another error is confounding of goals and letting staff's functions assume the aspect of goals instead of tools for line. One of staff's chief functions is to train line as much as practicable in staff's areas.

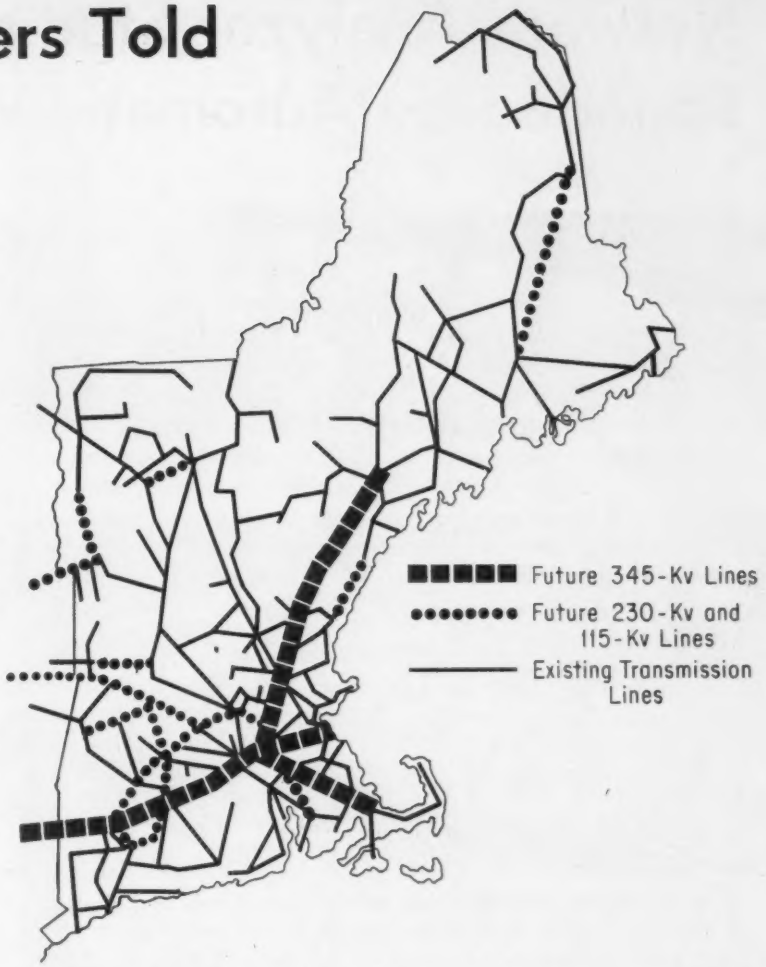
The benefits of considering four medium-size companies as a single system were outlined by Harry Mochon, Hartford Electric Light Co. A four-company powercast has yielded savings in joint system operations that may be enough to pay for the study. In setting up the study, although there was almost no load diversity among the four companies, it was found they had first to resolve four different philosophies. The compromise reached did not standardize all practices when there was good reason for retaining some of the peculiarly local practices.

New England companies' announced plans for a $100-million transmission program are "the kind of story we should be telling more loudly," EEI President Philip Fleger told his ECNE audience.

Speaking on "Trends Affecting the Power Industry," Vermont's Senator George Aiken predicted that "growing dependence on the federal government to regulate industry and commerce will continue, probably at an accelerated rate. We may not like it, but we can't stop it.

"As far as the utility industry is concerned," he said, "I can see no serious demand for government acquisition of existing facilities in the foreseeable future, barring war, major depression, or failure of the industry to meet national needs.

(*Continued on page* 106)

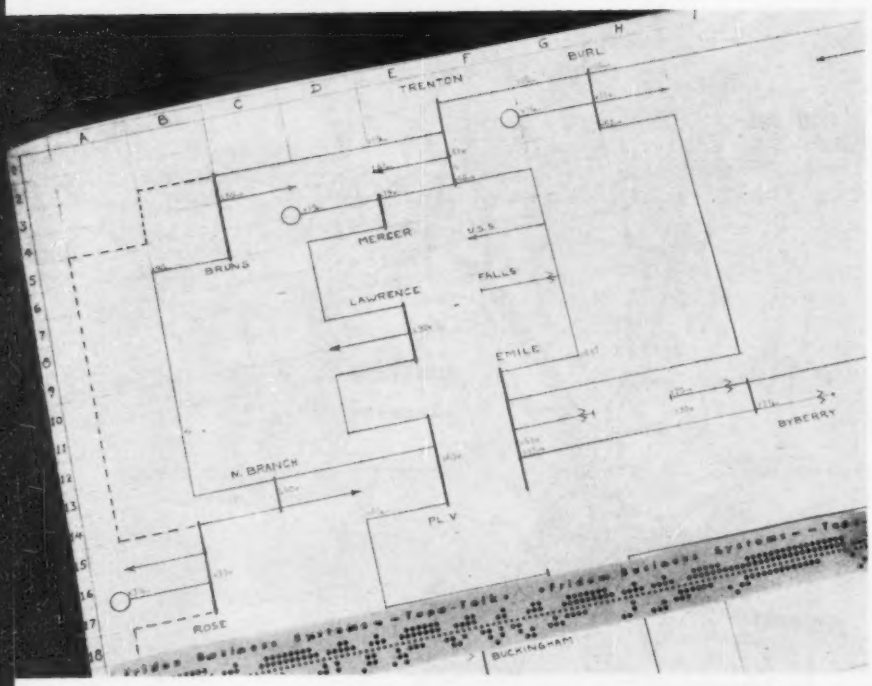


POWERWAYS in New England, both existing and planned, are shown as an increasing complex of transmission lines, interconnections, and pooling

Network Analyzer Studies Speeded by Automatic Write-Out

Types readings on line diagram of power system; produces a neat and accurate diagram at fast speed

C. A. BELSTERLING, Manager, Power and Control Laboratory, Franklin Institute Laboratories, Philadelphia, Pa.



1 BASIC SYSTEM DIAGRAM uses only horizontal and vertical lines and serves as guide for producing punch tape at lower part of photo

2 OPERATOR TYPES desired readings and expected directions at proper location and automatically produces punch tape at far left

Readings from the network analyzer are now being automatically printed on system line diagrams at the Franklin Institute. In addition, the automatic equipment also provides better visual metering and a program which can be set to read selected quantities at selected locations.

The automatic print-out has the following advantages:

- Less chance of human error
- Neat, precise, and uniform system records
- A potential saving in recording time
- Freeing of 30% of two operators' time.

The automatic equipment operates in the following way. First, a conventional type of line diagram of the power system, drawn on a specially spaced grid pattern, is inserted into the programing typewriter. Except for a few special key designations and an extra wide, 30-in. carriage, this is a standard automatic electric typewriter. To it is connected a paper tape punch which records each operation of the typewriter keys in proper code.

Then the carriage is positioned to the first point on the diagram where a quantity is to be recorded. The calculator circuit is typed on the diagram. An arrow indicates the expected direction of flow of watts and vars and a "v" or "i" indicates volts or currents; typing these will call out the reading automatically in proper sequence.

The carriage is then moved to the

next position for recording, and the process is continued. When all metering points have been covered, the results are a complete line diagram with circuit designations and desired quantities neatly typed in their proper locations. In effect, this is a visual record of the paper tape program which automatically directs the operation of the recording equipment.

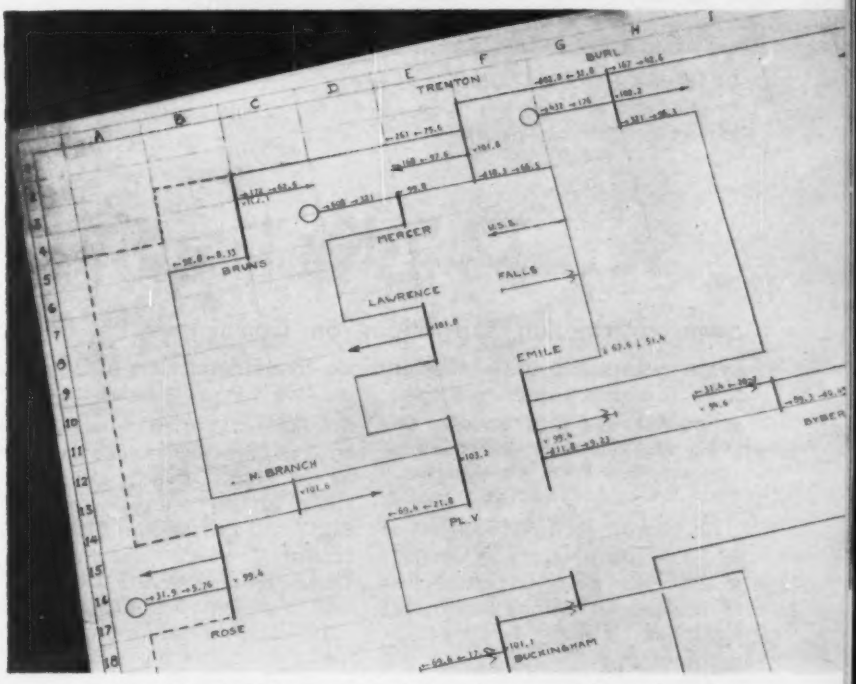
The automatic recording equipment consists of several sections: Tape reader, calculator circuit selection, metering, analog to digital conversion, and print-out. In operation, the paper tape program is inserted into a conventional Friden reader and a fresh line diagram is properly located in a second automatic typewriter. When the reader is started, the carriage is automatically positioned on the schematic diagram, and relay circuits select the proper calculator circuit. Metering circuits are connected and the proper current shunt selected automatically.

The analog voltage representing the metered quantity is converted to digital form, then used to operate the appropriate typewriter keys. When the operation is completed the reader advances the typewriter carriage to the next metering point and the process continues until the program is satisfied. The result is a schematic line diagram of the power system with metered quantities neatly typed at the proper locations.

The automatic equipment serves a secondary purpose which adds to its value. Normally when balancing the system, one operator makes manual adjustments of calculator units while a second operator reads the desk meter and tells him how he is doing. A conventional digital display was added to the metering and conversion circuits already in the automatic write-out equipment. This display can be read from any part of the calculator room. Now one operator can perform the balancing operation alone.

Ultimate value of the automatic write-out equipment to the ac network analyzer operation is still to be realized. However, tentative experience has shown that it frees considerable operator time for other tasks at the same time that it produces a cleaner and more accurate line diagram.

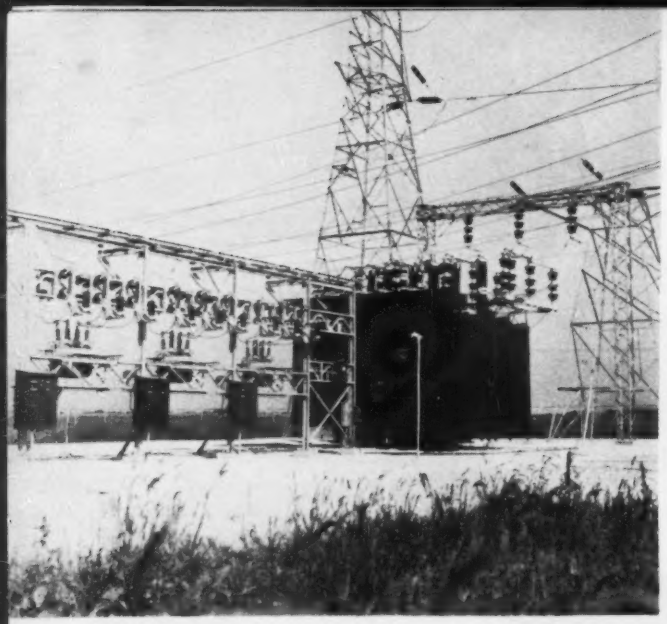
3 **PUNCH TAPE** goes through small machine at right and directs automatic reading and print-out which is done by typewriter in center



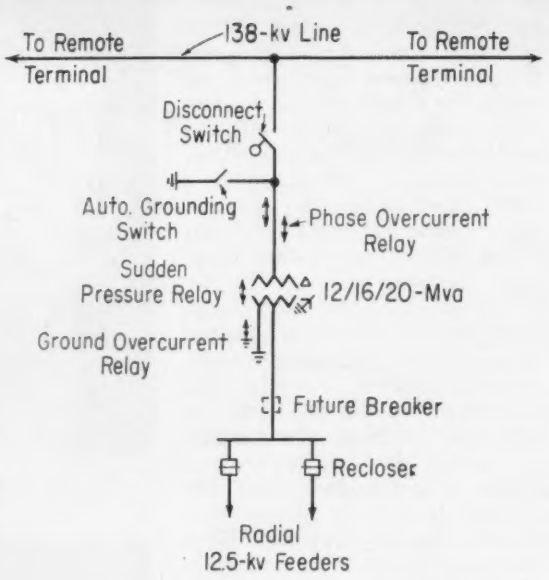
4 **SCHEMATIC OF SYSTEM** is produced neatly, accurately and quickly. Diagram shows results of automatic write-out from typical study

Franklin Institute AC Network Calculator

Utilization Time: 99%
Permanent Staff: 2 full-time operators
Generating Units: 28
Transmission Lines: 270
Tap-Changing Transf: 54
Line Capacitors: 90
Large Load Blocks: 90
Space and Location: 2,500 sq ft; Science Museum Building, Philadelphia, Pa.
Accessories: Light-coded plotting table
Operation: 440 cycle with base quantities of 100 v, one amp, and 100 ohms
Flexibility: Separable into two independent units—one-third and two-thirds —each operates from separate control and metering desks
Users: Seven electric utility companies



DISTRIBUTION SUBSTATION is supplied directly from nearby 138-kv transmission line, a scheme dispensing with intermediate transformation at 34.5 kv



PROTECTION of 138-12.5-kv substation consists of relays which close grounding switch to trip 138-kv line ends

12.5-Kv Load Is Served Directly

Some distribution substations on Commonwealth Edison system dispense with intermediate transformation at 34.5 kv

M. COOPER and **R. L. BOLGER**, System Planning Department, Commonwealth Edison Co, Chicago, Ill.

To improve the basic economy of 12.5-kv distribution, Commonwealth Edison Co is putting into effect plans for feeding distribution substations directly from 138-kv transmission lines.

This scheme eliminates an intermediate transformation at 34.5 kv and releases the capacity of the 34.5-kv lines and the 138-34.5-kv transformers serving them. Three 138-12.5-kv substations will go into service this year with one 12/16/-20-Mva transformer and provision for a second transformer.

In certain cases utilization of the tertiary winding of 138-34.5-kv transformers has proved to be economical for serving 12.5-kv distribution load near subtransmission substations. Two such installations are planned, the first to go into service this year.

About four years ago Commonwealth Edison adopted 12.5 kv as the standard distribution voltage for areas not heavily developed at 4 kv. In the areas outside Chicago, the initial 12.5-kv sources were 34.5-12.5Y/7.2-kv transformers utilizing existing 34.5-kv line capacity. These generally were 5,000/6,250-kva, OA/FA transformers with ±10% LTC, each supplying one feeder which was protected by a 3-phase oil circuit recloser.

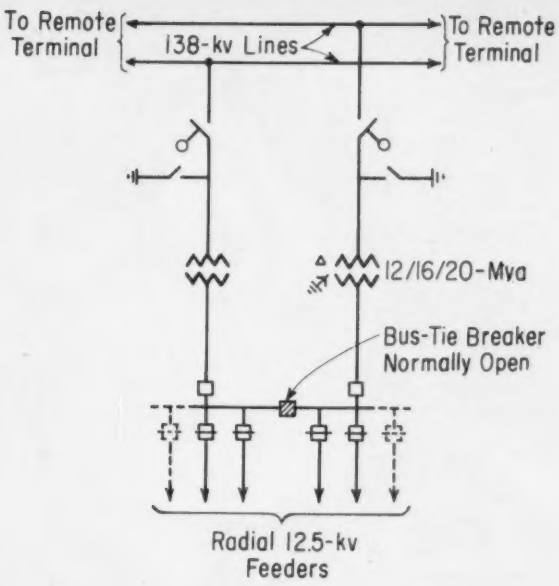
Must Be Near Line

But a basic economy resulting from the higher distribution voltage can be achieved by transforming directly from the 138-kv transmission voltage. If costs are held to a minimum, loads initially as low as 5 Mva can be served economically from 138-12.5-kv substations. For such small loads, the substations must be adjacent to existing 138-kv lines and installed on the transmission right-of-way, to eliminate need for additional property or 138-kv lines.

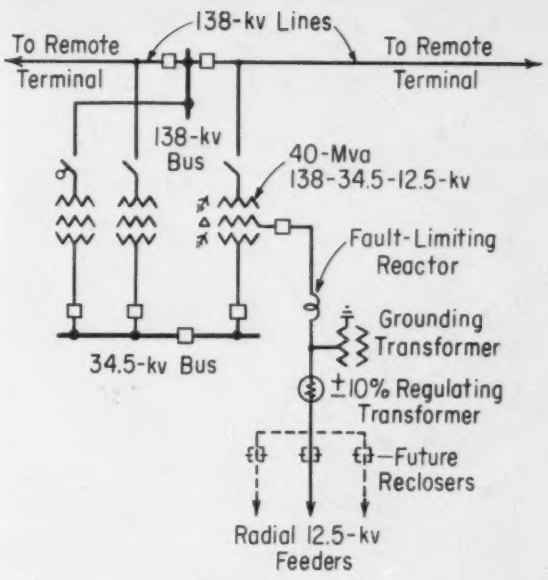
Three 138-12.5-kv distribution substations will be placed in service in 1961. Each installation initially will consist of one 12-Mva OA transformer supplying two 12.5-kv feeders, each protected by a feeder recloser. Transformers will be equipped for the addition of two stages of cooling to provide ratings of 16 and 20 Mva, each.

Transformer protection is by a sudden-pressure relay which trips a grounding switch to force tripping of the 138-kv line at its remote terminals. Backup relaying is by phase overcurrent relays on the 138-kv side of the transformer and a ground overcurrent relay on the 12.5-kv side. These relays trip the grounding switch. The ground relay provides backup protection for any failure of the feeder reclosers to clear feeder faults.

In addition to tripping the grounding switch, operation of any of these relays causes a motor-operated transformer disconnect switch to open after the 138-kv line is de-energized. This removes the faulted equipment from the system and allows the transmission line to be restored to service. Feeder reclosers are 3-phase, 560-amp units, with 8,000-amp (3-phase symmetrical) interrupting capability.



SECOND TRANSFORMER, 12/16/20 Mva, will be added when load exceeds what can be transferred quickly



TERTIARY WINDING of 138-34.5-kv units can serve economically 12.5-kv load near subtransmission substation

From 138-Kv Transmission Lines

When the load served by the initial one-transformer installation exceeds the amount that can be transferred to other sources during a transformer outage, a second 12-Mva OA transformer, supplied from a second 138-kv line, will be added. The thermal overload capability of the transformers give this installation 16 Mva of firm capacity. With load transfer to other sources during an emergency, the substation normally can serve a peak summer load of 20 Mva. When the two stages of transformer cooling are added, the firm capacity can be increased to about 26 Mva and the normal summer peak load to about 30 Mva.

Breaker Normally Open

To keep the fault duty within the limits imposed by available distribution-type protective devices and improve voltage regulation, the bus-tie circuit breaker normally will be open. With the loss of either transformer, its 12.5-kv circuit breaker will open and the bus-tie breaker will close, resulting in only a momentary outage.

When greater loads than can be supplied from two 12/16/20-Mva transformers are expected, provision will be made for four such transformers supplying 12 feeders. 138-kv supply generally will be provided from two lines, with two transformers served from each line. A 138-kv bus utilizing motor-operated disconnect switches, rather than oil circuit breakers, will provide either automatic or supervisory controlled switching to transfer transformers from one line to the other during a forced outage of one 138-kv line.

Tertiaries Used

Another source of direct supply to 12.5-kv distribution feeders from the 138-kv system is the delta-connected tertiary windings of 138-34.5-kv transformers in about 28 substations throughout the service area. Tertiaries of most transformers of this type on the system are rated from 12 to 13.2 kv. Transformers purchased recently have 13.2-kv tertiaries, all with a rating of at least 35% of the transformer nameplate capacity.

Use of the tertiary winding to serve 12.5-kv distribution in the vicinity of two 138-34.5-kv substations is currently planned. The first will be in service this year, the other is scheduled for 1962.

Where the transformer LTC is in the 138-kv winding, as generally, the 12.5-kv regulator may be eliminated under favorable circumstances. The LTC then will serve as voltage control for both the 34.5 and 12.5-kv buses.

If a separate 12.5-kv regulator is required, a single unit combining the regulating and grounding equipment in one tank may be installed. Compared with separate regulators and grounding transformers, the single-tank unit has a lower installed cost and needs less space for installation.

Transfers Practicable

As load grows and the number of installations increases, transformation directly from 138 to 12.5 kv, whether by a separate 138-12.5-kv transformer or through tertiary windings, will permit the removal of many 34.5-12.5-kv distribution center transformers. These will be transferred to areas of low load densities as a temporary, low-cost expedient until the load justifies direct transformation from the transmission system.

BUTYRATE GLOBE, not unlike glass one in design, has spun aluminum canopy and an injection-molded plastic finial

GLASS GLOBE originally in use in residential areas is being replaced due to enormous incidence of breakage

Butyrate Street-Lighting Globes

Hardier luminaires replacing glass in suburban streets meet LILCO light transmission, weathering requirements

NICHOLAS E. PICCIONE, Materials Section Supervisor, Long Island Lighting Co, Hicksville, N. Y.

Plastic globes improve street lighting and give Long Island Lighting Co savings in replacement and servicing costs. Satisfied with the ruggedness of the material and with the outcome of other critical tests, LILCO is installing 2,000 of the ornamental acorn-shaped luminaires in areas selected for high breakage of glass globes. Sample globes withstood a test impact of 40 ft-lb at 0F.

The new globes are blow-molded from extruded butyrate cylinders, their specifications calling for a minimum but uniform gauge of $\frac{5}{32}$ in. in wall thickness. The complete street lighting unit, consisting of the butyrate globe, a spun aluminum canopy, and an injection-molded plastic finial, or handle, costs LILCO somewhat less than the replaced equipment.

The 2,000-unit installation was preceded by a test installation of 200 plastic globes, which proved the material's good light transmission qualities, weatherability, and resistance to impact. The test was also staged in high-breakage areas.

Extrusion Was Problem

In solving the problem of extruding the plastic in a diameter that would accommodate LILCO's Type 95 spun aluminum street lighting standard, the utility had the cooperation of suppliers of Tenite butyrate, and of extruders. Their first problem was the design and construction of a die for producing test samples of the cylindrical globe. Engineers of the three companies, working together, came up with both the die and the samples.

The problem of the enormous incidence of the breakage of glass globes used on residential-area street lighting standards was particularly nettlesome to LILCO's management and engineers. Vandals inflicted a heavy toll of globes whose replacements cost upwards of $50,000 a year. Without psychiatrists or experts in social behavior, the company had no explanation of why glass globes atop 10-ft standards were singled out for wholesale destruction.

Long Island residential areas, it seems, have an unconscionable number of those in whom the urge to throw rocks or fire other missiles is an instinct inherited from the cave-man age. The urge in its beginning was founded on the fact that a well-aimed missile meant a meal or a wardrobe for the family. But shattered glass has no nutritive value and no use at all as protection against the elements.

What the company discovered was that today's Nimrods can be classified in these categories: Delinquents who throw rocks because they are delinquents; aspiring marksmen who find globes handy targets for BB-gun practice; and Romeos who feel that darkness promotes romance on the street or in parked cars.

SOME 200 cylindrical extruded butyrate globes were used in LILCO test

WIRE-MESH CAGES did a fine job of protecting glass globes, but had poor light transmission, retained dents from stonings, and threw eerie shadows on ground

Resist Breakage by Vandals

LILCO's efforts to thwart these assorted globe-busters began with the development of an expanded metal cage in the form of a truncated cone. This protected the bulb to some degree, but light emission was not satisfactory. Some customers complained that the wire-mesh cage wasn't decorative; others that the cage left "weird shadows" on the ground.

Furthermore, the company found that the cage remained dented and deformed after one of the expected ground-level bombardments.

Shifts to Plastics

The search then shifted to an investigation of plastic as a replacement for glass. Several compositions were tried, but failed to meet weathering, light-transmission, and other physical requirements. The ideal plastic had to meet not only these combined specifications, but had also to lend itself to fabrication bringing it within the cost range of glass.

Of the plastics explored, butyrate appeared to have the best potential. As the company's experience with butyrate in extruded conduit for cable installations had been satisfactory, the engineers were of the opinion that similar material might well provide the answer to the breakage problem.

For test purposes, the butyrate was extruded in larger diameter and cut to adequate lengths. A cap and finial were added. But for reasons of economy, it was not molded into the plastic luminaire in its final 109 form. This had to wait until its performance had been proved.

Close inspection of the butyrate globes a few weeks after they had been mounted for field test disclosed that all were intact despite the fact that several had been battered with rocks, stones, air-driven pellets, and other missiles. The assaults were evident in scuffs and pockmarks on the plastic surfaces.

When laboratory and service tests had been completed satisfactorily, the project was ready for its final production phase—the molding of the globe to the desired form.

Several methods of fabrication were investigated. Vacuum-forming in two symmetrical sections, followed by cementing of the sections, proved economical, but the product failed to hold up under impact. Injection molding was considered, but the mold costs were high, and furthermore, the stress relief of the globe was not practicable with this method.

Quality and cost requirements were best obtained by blow-molding the globes from extruded butyrate cylinders. Specifications were prepared, and several plastics molders were invited to bid on the globe and its canopy.

Saves Awesome Bill

By switching to the virtually indestructible butyrate globes, the company expects to save itself an awesome bill in replacement costs and a formidable number of servicing man-hours. One measure of the company's success is the several letters found by the police and company servicemen at standards upholding the new luminaries. These expressed high dudgeon that darkness was no longer available with flip-switch immediacy for street enterprises that prosper unseen.

Remote Tie Breaker Firms Radial Service

New substation's relaying provides for instantaneous transfer of power source for Vancouver business area

ROBERT C. WILLIS, Associate Engineer, Clark County Public Utility District, Vancouver, Wash.

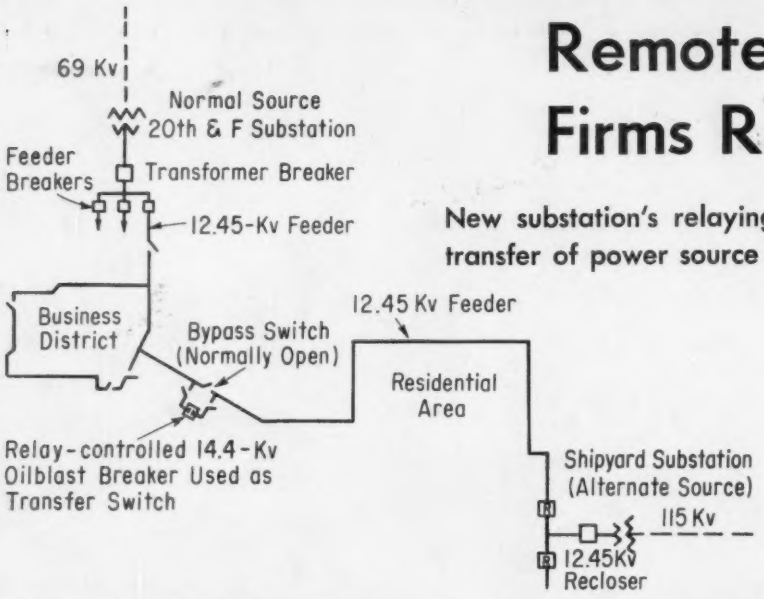


FIG 1—SYSTEM SCHEMATIC shows location of remote-controlled circuit breaker in 12.45-kv tie between the two substations serving Vancouver business district

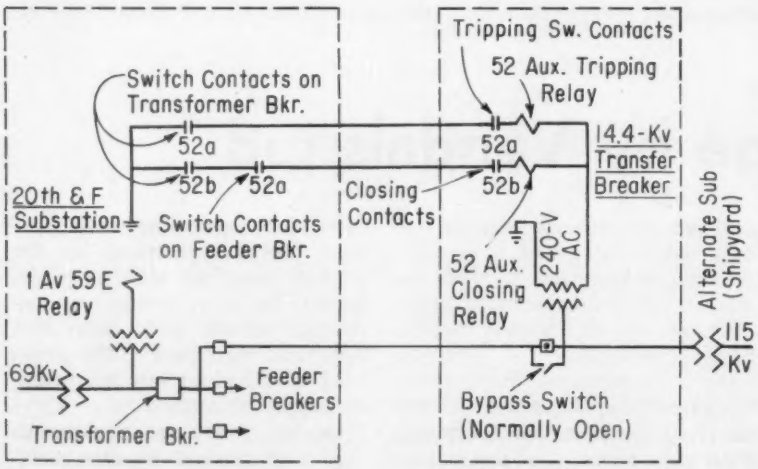


FIG 2—RELAY SCHEME is illustrated to show functional positions of components active in instantaneous transfer of power source as follows:

Tie Breaker Operations

Condition	Normal: Business Area Served by 20th & F Substa	Sustained Outage of 20th & F Substa	20th & F Substa Returns to Normal
Transformer Breaker at 20th & F	Remains closed	Voltage relay opens transformer breaker. Contact energizes closing coil of tie breaker	Network relay closes transformer breaker
Remote Tie Breaker	Remains open	Remains open momentarily, then closes to pick up area from Shipyard Sub	Remains closed momentarily. Contact on reclosed transformer breaker opens tie breaker

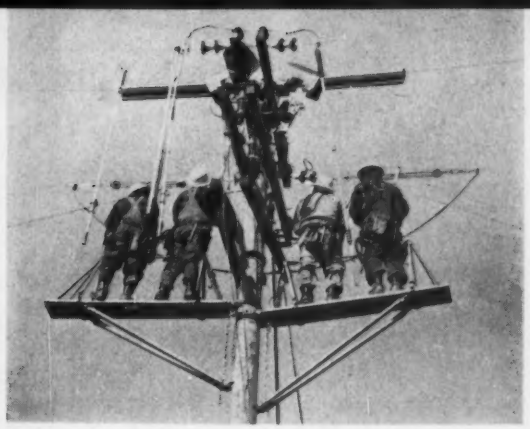
A non-reclosing power circuit breaker in the tie line between two substations, with appropriate relaying, affords an alternate power source to the downtown business district of Vancouver, Wash.

Normal 12.45-kv service comes from the new 20th & F Substation which is supplied by a 69-kv line. This substation was designed as a primary network master unit with the customary sensitive-reverse-power and phasing relays on the transformer breaker. It also has phase and ground relays for backup protection as well as the usual phase and ground time and overcurrent relays on outgoing circuits.

Supplied at 115-Kv

The proximity of Shipyard Substation, supplied by a 115-kv line, made emergency capacity available to the business district. This was accomplished by installing a 14.4-kv, 250-Mva, oil-blast circuit breaker in a tie line between the two stations' service areas. The tie breaker is controlled automatically from 20th & F's transformer breaker, using 240 v ac on a No. 4 aluminum triplex circuit, so that a power failure of the downtown network causes instantaneous transfer to the alternate source.

The network relaying already available in 20th & F Substation provided most of the intelligence required for this transfer. It was necessary only to add one low-voltage relay to detect the outage and send a closing signal to the tie breaker. Additional equipment at the tie breaker, housed in an outdoor cabinet, comprise three overcurrent relays, two on phases and the third on ground; a hand-reset lockout relay; two auxiliary relays; a control switch with indicating lights; and an auto-charged tripping device.



'Diving Boards' Simplify Pole-Top Work

JOHN E. LA CROSSE, Line Foreman, Central Maine Power Co, Rockland, Me.

Safety margins are increased and work is simplified and accelerated when prefabricated deadends and insulated "diving board" platforms are used during hot stick installation of suspension insulators in Central Maine Power Co's distribution lines.

Hot wire work is accomplished from diving boards mounted 8 to 9 ft below the 12.-47-kv primaries. Use of two 6-ft diving boards permits four linemen to work effectively on both sides of the pole on double deadend jobs. This practice is common with Central Maine installations of line cutouts, air break switches, reclosers regulators and other series equipment.

False deadends are constructed on the ground for small copper and copper weld conductors. The false "prefab" deadends are made by first attaching a manual or compression fitting on one end of a 2-ft piece of wire, and then placing a half completed compression sleeve on the opposite end.

After the bell-deadend assembly is attached to the crossarms, cumalongs are placed on the dead wire by hand and on the live wire by either a shotgun or tie stick. When strain is applied to the blocks the disc insulators are drawn parallel to the conductor and the sleeve is in position for an easily accessible splice with virtually no loss of slack.

Cutting double deadends into a line in this manner puts the work out in the open and away from the pole, crossarms and other fixtures. This decreases possible accidental contacts and gives the linemen an unobstructed view to complete the splice. It also eliminates using insulated wrenches on manual type clamps, fork sticks to support insulator strings and hot stick insertion of clevis pins and cotter keys. The diving board insulates the linemen from ground and keeps them well below the hot conductors.

This methed is used on solid copper conductors No. 1 through No. 6 and on 2A, 4A and 6A composite wire. All aluminum, AAAC and ACSR wires are terminated with straight, feed-through type clamps and tightened with a hot line wrench.

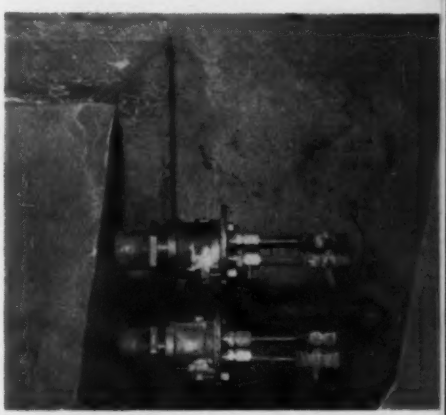
When using manual type clamps to hold composite wire that requires tinned armor ribbon, the ribbon can be applied by hand on the ground to a short piece of the appropriate sized wire instead of using a hot line armor applicator in the air. By sleeving onto the piece of wire made into the shoe it is unnecessary to manipulate and shape the hot wire around the clamp.

Seal Pitot Tubes Effectively

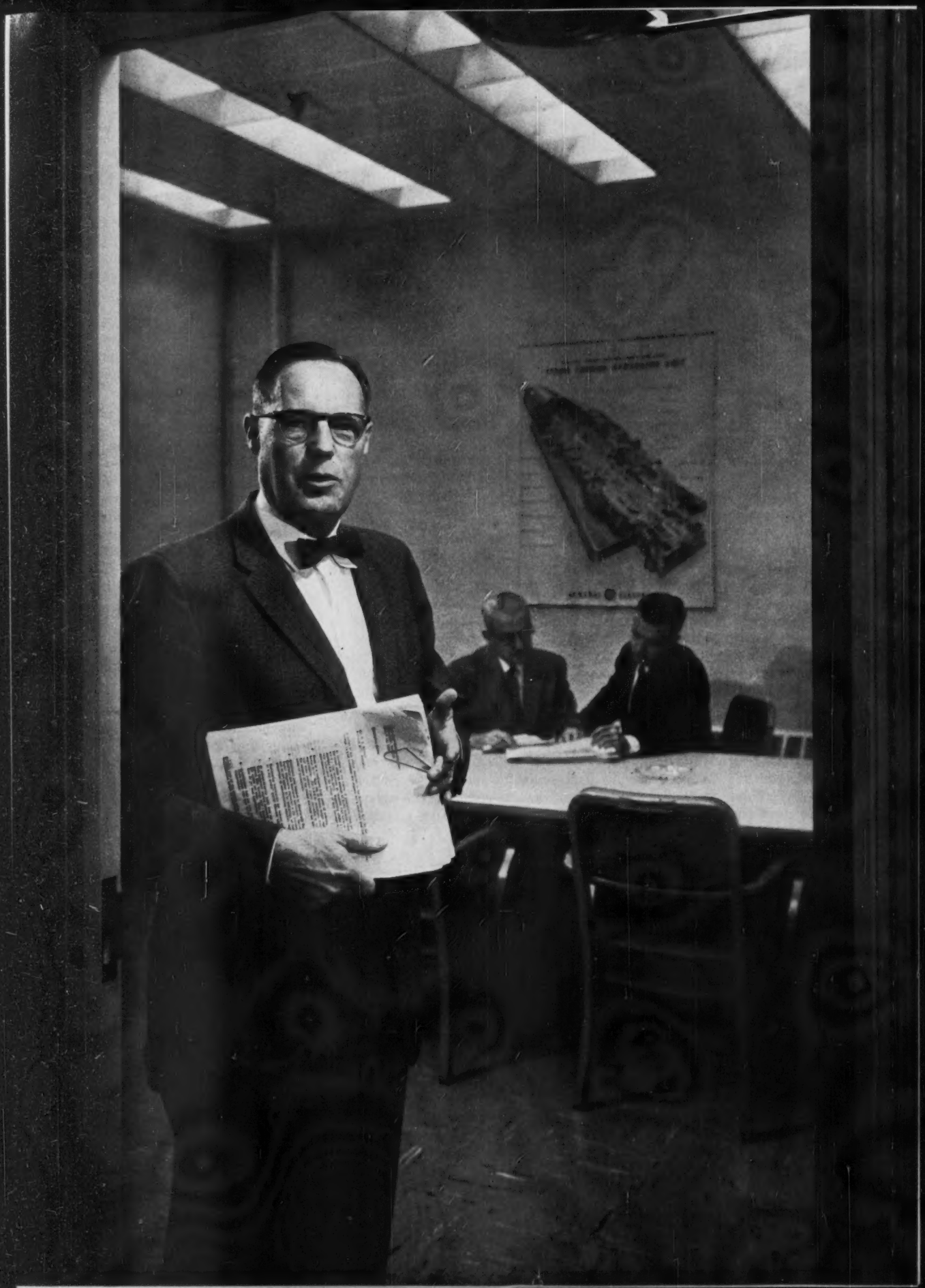
A rigid-type sealing arrangement is being used by TVA to prevent leakage from Pitot tubes of the primary air fan ducts.

The Tennessee Valley Authority's Colbert Steam Plant had a continual maintenance and cleaning problem where a gland-type sealing arrangement with asbestos rope permitted air and fly-ash leakage from the lower end of the Pitot tubes in the primary air fan ducts.

The new rigid-type sealing arrangement which was developed consisted of a gasketed flange cover with tapped holes for two male connectors, size ½-in. male pipe thread for the tapped holes in the flange, and ½-in. outside diameter tube size. The inside openings of the connectors were reamed to the outside diameter size of the ¼ in. pipe of the Pitot tubes. Ferrules were then installed on the tubing for compression fittings to the male connectors. The ferrule of these fittings does a perfect job of sealing around the Pitot tubes.



RIGID-TYPE SEALING arrangement stopped leakage from Pitot tubes



E. S. WATERS, Manager—Purchasing of General Electric's Large Steam Turbine-Generator Department discusses Productive Purchasing:

Utility Purchasing Agents Check Added Values

No purchasing agent in today's electric utility would regard buying strictly on price as good purchasing—and certainly not as Productive Purchasing. The stature which the purchasing agent has achieved in the last twenty years is directly traceable to at least three things: his skill in applying such modern techniques as Value Analysis, the productive relationships he has established with other utility functions—engineering and sales, for example—and his skills in identifying total values in products and materials.

Look for these values to add profit to your purchases:

QUALITY CONTROL today goes beyond adherence to specifications and the use of statistical sampling methods. Check on a supplier's creative approach to reducing the cost and improving the results of this critical activity.

PRODUCT DEVELOPMENT or materials improvement is offered by creative suppliers who see their business dependent on helping you serve your customers better.

ANALYTICAL ENGINEERING offers you the latest tools of rapid analysis and research. Check to see if your supplier can make studies to help improve your utility's efficiency.

APPLICATION ENGINEERING capabilities of a supplier should be checked to avoid buying products which do not properly go together into an engineered system.

PROJECT CO-ORDINATION focuses the full capability of the supplier's management and engineering structure on your order for product combinations or systems. Check to see if he can give you this added value.

VALUE ANALYSIS examines a finished product to assess added product functions, values, and economies. Check to see if your supplier is achieving savings along with product improvements by this method.

PROMPT DELIVERY is an added value when the supplier takes steps (automating paper work, for example) to give you an even better delivery schedule.

INSTALLATION & SERVICE ENGINEERING are important capabilities to consider when buying electrical apparatus. See if your supplier can simplify start-up problems and help train operating personnel.

SERVICE backup can be evaluated on the basis of reputation, past performance, and facilities and people in place. This added value can be as important as price.

MARKET SUPPORT is available from relatively few suppliers. Assess the value of market development programs undertaken by the supplier which contribute to the growth of your utility.

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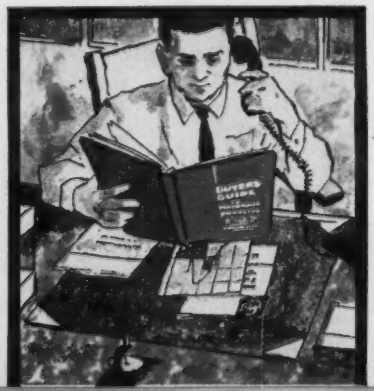
▲ APPLICATION ASSISTANCE helps in the correct selection of equipment, solving of metering problems.

▲ PRODUCT SERVICE aims at full customer satisfaction in any problem area; supplies technical data and assistance.

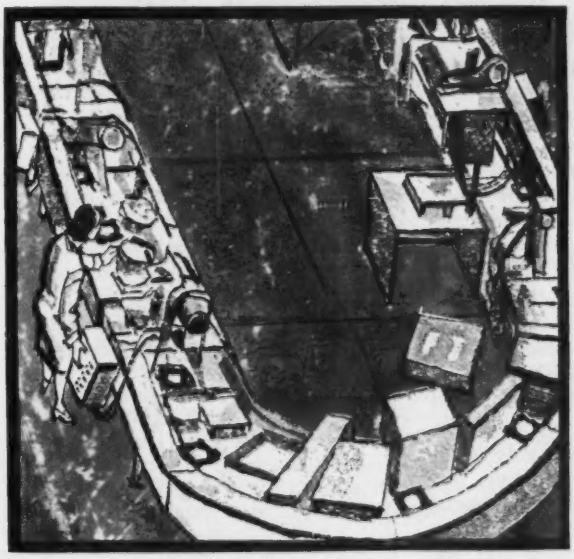
◀ METER COURSES teach basic information—and new advances—on single- and polyphase meters, help utilities cut training costs.

INDUSTRY COMMUNICATION—G. E. disseminates metering information of all kinds—technical, informative, statistical—to keep utilities abreast of new developments. ▶



You get all 10 metering extras from General Electric

LOAD BUILDING helps utilities in long-range expansion efforts—has long been supported by G. E. through programs such as Live Better Electrically, Medallion Homes, Residential Market Development.



LOW COST PER KVA results from advanced automated techniques, leadership in meter research and design.

The complete value of a metering purchase is not measured in product alone. The service a manufacturer supplies to meet utility needs, help solve utility problems, also represents substantial bonus value.

You see on the left a select group of the metering services General Electric provides the electric utility industry—10 valuable extras that cover the complete range of metering needs. Many of these extras go beyond the usual customer service; many have led the way for what is now accepted industry practice; many are exclusive with General Electric. Evaluate these metering extras in light of your own use. Measure the cost if you were to supply these services yourself. This is their worth to you.

Considering over-all value, what do these metering extras mean to you? Just this. When you buy General Electric, you get the best possible metering buy. General Electric's unmatched service package, teamed with industry's most advanced metering products, including such vital accessories as butyl-molded instrument transformers and meter sockets, means your metering dollar goes further, buys more, provides you with greater value than available elsewhere. For example, consider the product innovations pioneered by General Electric in single-phase meters.

- Magnetic-suspension bearing system—Between 1948 and 1960, more than 13,000,000 G-E magnetic-suspension meters were produced and in service on utility lines before other meter manufacturers adopted a form of magnetic bearing system.
- Steadily increased capacity—The capacity of G-E standard 3-wire, socket-type single-phase meters has more than tripled in recent years; yet, the cost per KVA of meter capacity has dropped from $0.98 to $0.32 just since 1954.

Before you place your next metering equipment order, measure the whole package — product and service. Then specify General Electric for today's most complete metering value . . . your best buy. 713-08

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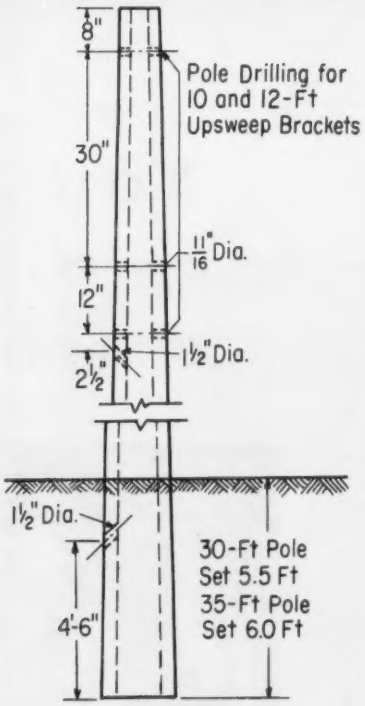
GENERAL ELECTRIC

Street Lighting Is Permanent, Economical

R. J. McCOY, Engineer—System Distribution Engineering, Florida Power Corp, St. Petersburg, Fla.



Florida Power Corp has turned to pre-stressed concrete for ornamental street light standards for their attractive appearance, freedom from maintenance, long life, strength, and economy. Such poles can be colored permanently to eliminate future painting. They have no exposed metal to rust or corrode and the concrete does not erode.

Pre-stressed concrete poles today are stronger than poles made of steel or aluminum for the same use. They come pre-drilled for mounting brackets and are suitable for overhead or underground supply. Additional holes can be drilled on the site or specified in the order. And, being set in the ground without a concrete base, like a wood pole, their installation cost is low. Brackets are designed for direct bolting.

Florida Power Corp's poles were developed by Dura-Stress Inc.

Solve Al Connector Cold-Flow Problem

G. L. FLYNN, Product Engineer,
T. L. RUNDLETT, Chief Engineer, Anderson Electric Co, Leeds, Ala.

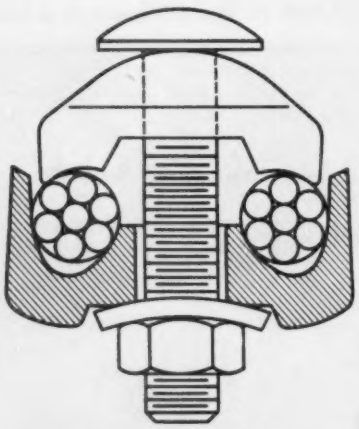
A connector with clamping pressure maintained by a spring washer compensates for cold flow in bolted aluminum connections. This design was developed from study of connections that had failed in service and from laboratory observations which showed that conductors under pressure deform in two stages:

1. Compaction and cold flow under initial pressure, reaching half value in about 20 min and approaching equilibrium in four hours.

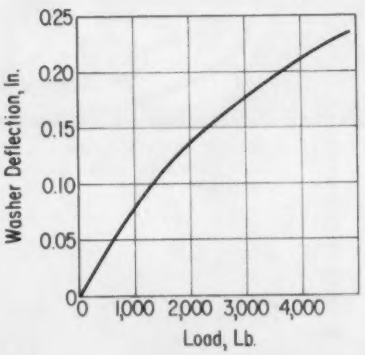
2. Additional cold flow when pressure is increased by thermal expansion caused by load-current.

Investigation accordingly was directed to determine how much contact pressure could be sustained without further cold flow and how little pressure would suffice for electrical conduction. Comparing this range with the range of pressures likely to be caused by temperature changes in service showed that, for practical materials and configurations, some compensation would be required. But this compensation could be provided by incorporating an elastic member capable of absorbing the excess pressure and so permitting expansion and contraction of the connection without permanent deformation.

This elastic member is a spring washer—a new type that is flat in its relaxed position—which deflects around a fulcrum formed in the connector body as the nut is tightened. A conical surface adjacent to the fulcrum provides a seat to prevent the washer's being overstressed. This washer compensates applied pressure for both the initial and subsequent relaxation, maintaining the electrical connection.

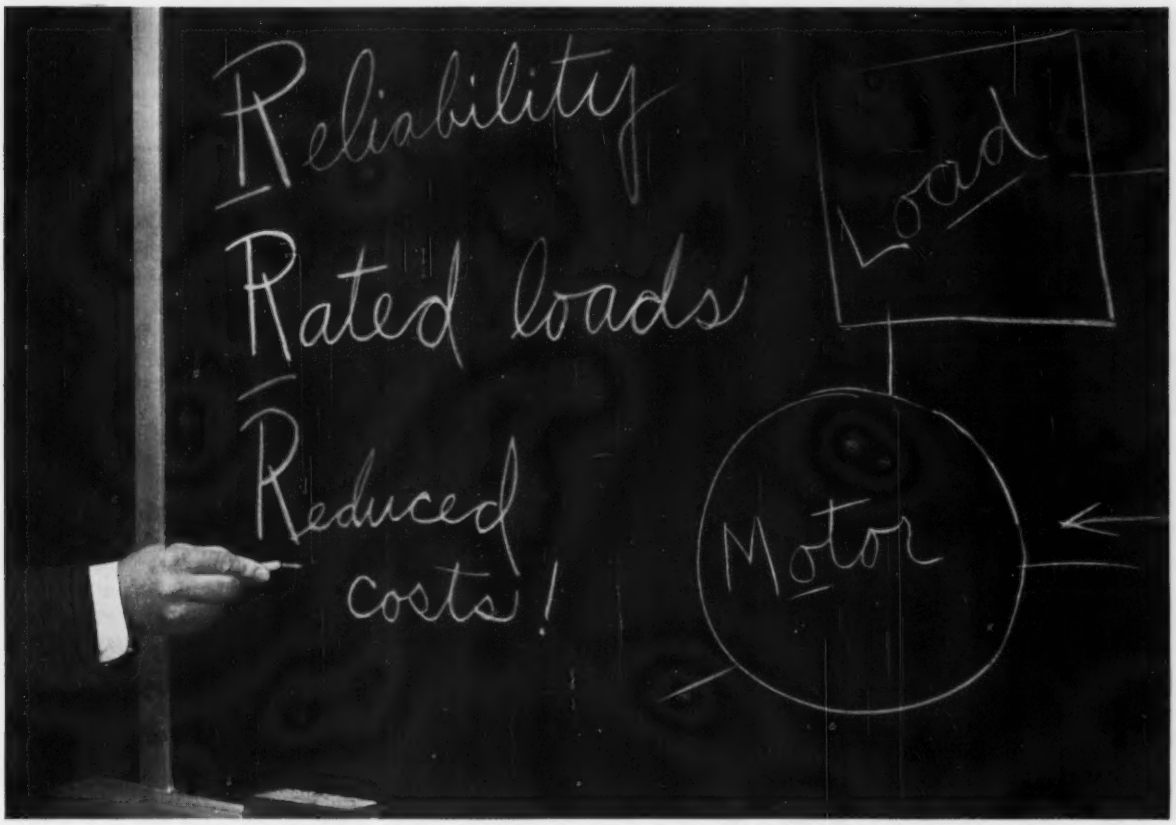


Loaded Spring Washer



SILICONE NEWS from Dow Corning

Consider these 3 R's...



...and you'll specify silicone insulated motors!

Electric motors, properly applied, are about as reliable as any rotating equipment can be. But what does "properly applied" mean? Do the newer motor insulation systems modify long accepted application practices? If so, how? What about reliability? Rated loads? And that old bug-a-boo, costs?

Reliability depends on where a motor is located and what kind of job it's doing. High ambient temperatures and the heat of overloads are handled easily by the high thermal stability of silicone insulation. Fly ash and other airborne contaminants bounce off sealed silicone rubber insulation systems without degrading reliability. Humidity and moisture are taken in stride by coils that have been high potted under water as a production check.

Rated load of driven equipment is frequently the maximum load a motor ever will be called on to deliver. Specifying motors with nameplate horsepower rated for short-term, peak load conditions is being outmoded as too expensive. Today, it's far more economical . . . and just as reliable . . . to specify silicone insulated extra service factor motors with horsepower rating based on nominal load conditions. Additional horsepower output — up to 50 percent above nameplate rating — is available for peak loads because of the excellent thermal stability of silicone insulation.

Reduced costs result from specifying extra service factor motors. Further savings . . . up to 30 percent of initial costs . . . result from specifying open motors with sealed silicone rubber insulation systems instead of motors with elaborate enclosures.

If you have not investigated Dow Corning silicone insulation systems, why not take advantage of the free literature offer below?

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Coordinate Research, NPC Is Told

Technical societies' combined efforts would cut costs, broaden studies, power group hears at San Francisco

Streamlining of technical societies' basic research programs for the power industry was urged on the National Power Conference at its recent meeting at San Francisco, Calif.

Within the framework that now exists, such programs can be coordinated and made broader and more economical, declared William H. Byrne, president, American Society of Mechanical Engineers. Coordination, he said, means lower research costs or conversely more research for the same money.

Rejecting direction of research through government regulation or sponsorship, Byrne continued: "I firmly believe that our national interest can best be served by private industry, and that technical advancement essential for the power industry will result from its own cooperative research programs. Reducing the costs of these programs by eliminating duplication cannot but be beneficial in expediting results and permitting more research."

Cites Alloy Tests

A technical society, Byrnes pointed out, does not conduct or finance research, but through volunteer committees and paid administrative staff serves as a clearing house.

He gave as an example of joint industry effort the ASME Research Committee's program for determining the strength and metallurgical stability characteristics of selected alloy and tube materials in 2,000 psi, 1,100-1, 500F steam. He summarized the results on austenitic steels and nickel-based alloys of exposure for 12 and 18 months, as follows:

1. No failures at 1,200 or 1,350F after exposure up to 18 months, indicating that these alloys are satisfactory for such service.

2. All except TP 316 and 15-15N tubes failed at 1,500F, the remaining tubes then failing by actual rupture, bulging, or excessive localized oxidation. These materials, it is believed, may behave differently when manufactured according to more recently developed practices.

3. The only mechanical properties appreciably influenced by such exposure were ductility (elongation) and impact resistance. These changed most in the first six months.

4. Although tubes that failed at 1,500F in the first six months showed excessive nitrogen pickup on the outside surface, such was not found to be the case in two failures.

5. The microstructural changes in certain alloys during exposure can be associated with changes in mechanical properties. Accordingly, Inconel is one alloy showing least change, and 16-25-6 one showing the greatest change in mechanical properties.

6. Further testing is expected to develop significant data on the behavior of commercial materials at 1,500F.

Reports on Eddystone

Engineers crowded the session at which a year's operation of Eddystone No. 1 at 5,000 psi and 1,150F was reported. J. H. Harlow, Philadelphia Electric Co, reported that "no facts have developed, which indicate that the present technical knowledge is not adequate."

"This is not to say," he went on, "that there were no troubles. As a matter of fact, putting the unit on the line was accompanied by many frustrations, delays, and operating difficulties."

Harlow noted that "probably the most unanticipated new problem" was copper deposits on the turbine blading.

"Even before the 1961 internal inspection, it was obvious," he said, "that Eddystone No. 1 would join the Philo and Avon No. 8 supercritical units in showing these deposits. A very definite reduction in steam flow at fixed stage pressures and a falloff in superpressure turbine efficiency indicated this to be the case.

"The deposits were predominately in the superpressure and very-high-pressure turbine, greatest accumulation in the stages of the VHP element. This is in the pressure range of 2,500 to 1,100 psi. The deposit on the rotating blading was 35 to 40 mils thick."

An effort is being made, Harlow said, to determine the basic mechanism of the copper deposit, to see whether anything can be developed to reduce the copper pickup in the pre-boiler cycle and find a way to remove the turbine blade deposits without disassembling the turbine.

A way is sought to eliminate copper from the feedwater, he added. A careful copper and nickel balance around the heater system appears to indicate that most of the pickup is on the steam side of the feedwater heaters. A method of cleaning the heater drains, such as a filter or demineralizer, could go a long way in alleviating the troubles with metallic pickup.

The Eddystone drains, most feasible place for applying such a device, have a temperature of about 275F, which is high for any known ion-exchange material. Yet this approach appears to be the most rewarding, he said.

Describes Reactor

John Barnard, General Electric Co, described the experimental reactor designed for use as a flexible fuel test bed for the ESADA group of New York state utilities.

When it goes critical next fall, it will permit simultaneous testing of many experimental fuel elements, for possible use in power reactors producing superheated steam, Barnard said.

Improvement in fuel elements is among new developments considered by General Atomic in its part of the ESADA program.

"Fuel particles coated with pyrolytic carbon or other material," said Titus LeClair, "can retain fission products until an appreciable fraction has decayed. This makes possible the design of a simpler and more economical fission-product trapping system. Further study should be undertaken to determine whether a high-temperature, gas-cooled plant can operate on a complete thorium cycle. Use of thorium enriched with U-233 will further ex-

(Continued on page 80)

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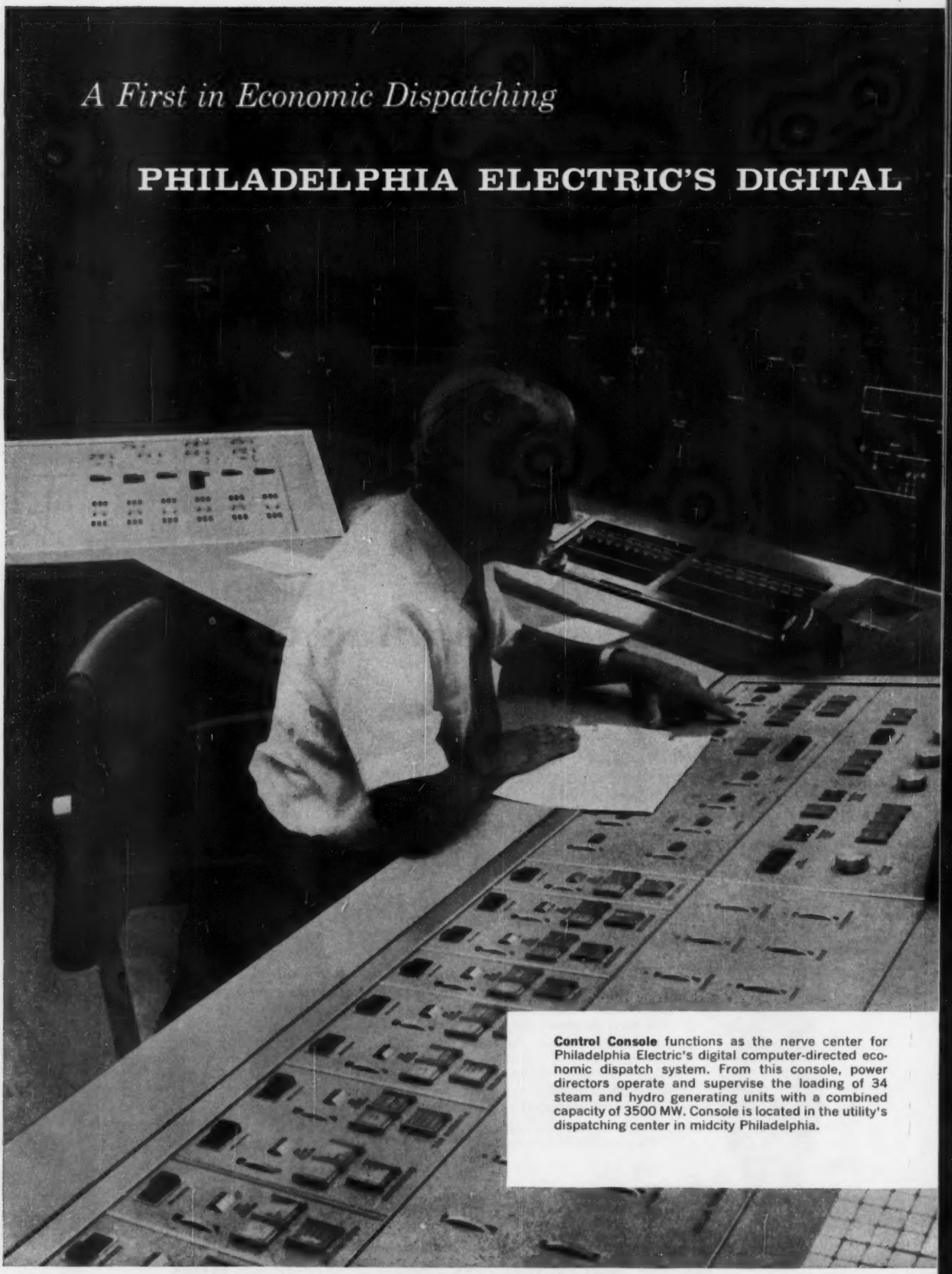
A First in Economic Dispatching

PHILADELPHIA ELECTRIC'S DIGITAL



Control Console functions as the nerve center for Philadelphia Electric's digital computer-directed economic dispatch system. From this console, power directors operate and supervise the loading of 34 steam and hydro generating units with a combined capacity of 3500 MW. Console is located in the utility's dispatching center in midcity Philadelphia.

COMPUTER-DIRECTED CONTROL SYSTEM

In its new economic dispatch system—the first of its kind in the utility industry—Philadelphia Electric Company combines an industrial digital computer with high-speed analog control elements to automatically assign generation. Developed jointly by Honeywell and Philadelphia Electric, the new system not only assigns generation for minimum incremental cost, but also computes tie-line interconnection billing data and solves other problems relating to power system operation.

Here are a few of the operating advantages the digital computer-directed system brings to Philadelphia Electric's extensive generating network:

1. The digital approach aids in modifying the control system as the power network changes or grows. Advances in the control art can be set into the computer by routine changes in the machine's program. This benefit can be realized only with digital computer-control.

2. The efficiency characteristics of each generating unit can be followed with greater accuracy.

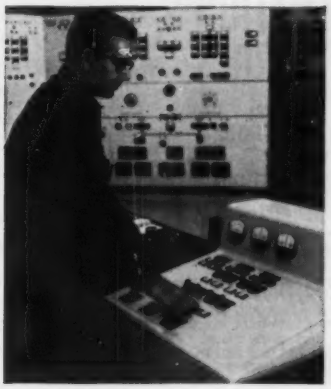
3. By considering both positive and negative slopes in unit incremental cost curves, the new system provides cost savings for Philadelphia Electric and other utilities who may use the Honeywell system to control valve point openings with their accompanying negative slopes in loading steam turbines. The use of analog equipment would necessitate a compromise between actual and programmed curves.

The system is designed for highest reliability with full consideration given to human engineering factors. Circuitry is all solid-state. System amplifiers, governor motor actuators, and rate limiters replace motors, servos, slidewires and vacuum tubes.

In the Philadelphia Electric dispatch system *all basic elements and virtually all the components*—from precision switches and meters to the computer and control console—were produced by a single manufacturer—*Honeywell*. Because of the integrated capabilities of its Industrial Products Group, Honeywell has been able to provide Philadelphia Electric with the world's most advanced economic dispatch control system.

For information on what Honeywell's Industrial Products Group can do for you, contact your nearest Honeywell field engineer. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pennsylvania. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell 290 Digital Computer combines with high-speed analog control elements to assign generation at minimum incremental cost. In making allocations, computer operates unattended and bases calculations on incremental production cost curves, fuel costs, performance characteristics, transmission losses and other information. Computer's instructions are then telemetered to power stations. Every ten seconds, the computer samples desired steam generation and makes new economic calculations which reset assigned generation among units. On command, the computer shares the control function with that of interconnection billing computation.



Station Consoles, located in each of Philadelphia Electric's nine plants, permit setting of the generating units' high and low limits and their rate of change based on operating conditions.

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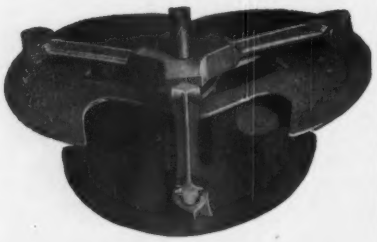

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Coordinate Research, NPC Is Told

(Continued from page 76)

tend the life of the fuel element."

Base-loaded nuclear-fuel-fired plants will be competitive in distribution areas, said W. E. Hopkins, Stone & Webster Engineering Corp, yet the development of EHV transmission offers immediate benefits as a stabilizing influence replacing diminishing competition among conventional fuels and fuel transportation carriers.

As gas and oil are priced out of the market, he said, "bituminous coal will continue its dominance as the fuel for thermal power generation, price increases being limited by natural abundance, technological improvements, and transportation competition."

"Much of the additional equipment purchased to automate a power situation is used to establish communication among control loops," said R. D. Hottenstine and R. Egglestone, Combustion Engineering Inc.

"Many extraneous control requirements," they said, "could be eliminated by designers who do not follow this separation of control areas, but design a complete control system. Equipment manufacturers must re-evaluate design concepts to eliminate the need for hand control."

H. H. Gorrie, Bailey Meter Co, urged an extension of automation through instrumentation. Too often the computer, he said, is extolled as the panacea for all operating ailments. In reality, it only removes operating tedium and affords continuous information on the quality of plant operation.

"This," he said, "leads to an entirely new set of operating problems, which require attention of the operating personnel—if gains in safety, fuel cost, or equipment life are to be realized."

Designers of plant and auxiliary equipment, Gorrie said, must seek nearly unattended operation. This, he added, involves simplification of controls along with clear and detailed knowledge of static and dynamic performance and operating limitations of specific generating equipment.

Hence, plant operators must decide upon set patterns of operation in normal and emergency situations, including safety interlock , trip, hold, or cutback operations, he said, adding that they must also fix the relationship of the operator to the over-all concept and the extent to which automation is justified.

Making a strong case for the special digital equipment for a specific application, Gorrie declared that "the general-purpose computer falls short primarily because of its complexity."

J. F. Cotter and F. C. Lisevick, Combustion Engineering, described a portable data logger which records on paper tape as many as 450 inputs from thermocouples, pressure transducers, and other linear sources. This information is converted to punched cards and processed on IBM 650 and 7070 computers.

A technique for reducing temperature shocks in starting turbines was introduced by John R. Hamann and D. C. Parker, Detroit Edison Co. It comprised keeping the control valves wire open during both the rolling and initial loading, 10% of the load being held until first-stage metal temperature reaches 730F.

Control valves are then closed at a rate that minimizes the first-stage metal temperature drop. When the after-throttle pressure nears line pressure, the throttle valves are opened and load is increased to 20% no faster than 5 Mw per min. The unit is then certified for service under system control.

United Operation Urged

(Continued from page 59)

of more than one pool, said Gussett.

"We will continue to participate in atomic-power research, generation by direct conversion, extra high voltage and dc transmission, and extra high voltage cable," he concluded.

Objectives of the current study of expansion patterns for the Iowa Power Pool were outlined by J. K. Dillard, Westinghouse Electric Corp. They include planning on a one-company basis, development of automatic programs for digital computation, and evaluation of unit size and site selection on the basis

of small units on each of the six member systems; large units on fewer systems; and combinations of small with fewer large units. Also under evaluation is the need for higher transmission voltages for both intrastate and interstate ties.

Dillard noted that this work is being done by power pool system planners. By March 1, 1962, complete evaluation of patterns, analysis of reserve requirements, determination of production costs, and planning of transmission should be accomplished.

All elements of the Iowa grid, conceived ten years ago, are now in place, said Frank Griffith, Iowa Public Service Co. Total capacity of grid systems has grown from 916 to 1,876 Mw, the largest unit today being 132 Mw compared with 46 Mw ten years ago. The grid has a reserve of 366 Mw, but 438 Mw of reserve would be needed for a single-company operation on a single-contingency basis.

Urges More Selling

Donald S. Kennedy, Oklahoma Gas & Electric Co, said that present management must select and train people to replace executives who will retire within the next decade. He urged the support of all employees and stockholders be elicited in selling the industry product—electrical power.

Automation and electrification of agriculture will move out of the push-button stage in the 1960's, predicted Hobart Beresford, Iowa State University. He reported on research projects in farm electrification supported by more than $150,000 in contributions from Iowa investor-owned electric companies in the past decade. Current studies relate to cooling ability of bulk milk tanks, more efficient conveying of bulk feeds and fertilizers, and the maintenance of better voltage on rural lines. Much extension and 4-H work also is supported by the utilities' grants.

Using 1948 as a base year, Beresford said that there are now five times the watts in poultry products, about three times as many watts per pound of pork, and twice the watts per pound of beef. Mechanized equipment for beef cattle is still in an early stage of development, but holds "tremendous promise."

BUY MEN?

OR RENT 'EM?

Keeping line crews on your payroll to perform all electrical maintenance and distribution work is needlessly expensive. The efficient alternative is to use qualified electrical contractors as a ready service team.

You get the skills and equipment you need *when* you need them.

You know exactly what every job costs.

You reduce equipment overhead.

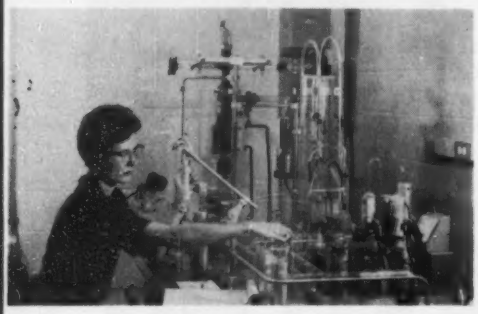
You avoid personnel headaches, get a firm job completion date, and written performance guarantee.

Why buy men? Rent the services of a qualified contractor. Write us today for the name and address of the *qualified* NECA contractor nearest you. National Electrical Contractors Association, 610 Ring Building, Washington 6, D. C.

NECA

METALLURGISTS check copper alloys with 250,000 X electron microscope

GAS CONTENT of copper alloys is being related to physical properties



'Research' Based on Stable Copper Market

During a recent press "open house" at a new $1.5-million Research and Technical Center in Waterbury, Conn., Richard M. Stewart, president of Anaconda American Brass Co, said, "As a solid and essential basis for metal research work, there is now available in the free world a reserve of copper ores adequate to support not only our research program and the new research activities of other copper mills, but also the world-wide copper research projects now under way by the Copper Products Development Assn. We know that the ore reserves of the free world will make possible the necessary copper and at reasonable prices."

The primary purpose of the new laboratory, it was learned, is to do research on metals, particularly copper and copper-base alloys. The aim of this research is to develop new products or to improve existing ones. Gilbert C. Strubell, administrative director of metallurgy and research, said, "We will be concerned with the properties of copper and its alloys which make them unique—conductivity, corrosion resistance, strength, ease of working, ease of joining."

Earl W. Palmer, director of metallurgical research, told *Electrical World*, "A major research effort will be made to obtain information for our users on the behavior of copper-base alloys at slightly elevated temperatures."

Part of the research program will consist of gathering data on these properties for the many alloys now known—determining the effect of temperature variation, impurities, or additives on these properties. Part of the program will consist of fundamental studies of these properties, such as the mechanics of corrosion, or the mechanics of precipitation hardening.

Both parts of the program are reported to have the same goal—to improve one or more properties in the many alloy combinations existing today.

Stewart, after having referred to the completely adequate supply of copper and its related reasonable and stable pricing level, stated, "Anaconda American Brass Co, now approaching its 150th year in business, accepts the challenge to produce significant results in the fields of extensive research and development."

B&W Recommends 'Once-Through' Boilers on 2,000 Psi and Up

The once-through-type boiler system will be recommended for all electric utility boiler applications requiring turbine throttle pressures of 2,000 psi and higher, Babcock & Wilcox Co announced recently.

Establishment of such a policy, which is effective immediately, is unique in the boiler industry because it literally endorses a single boiler design concept for application to electric power plants requiring steam pressure above the 2,000-psi level at the turbine throttle.

The high-temperature, high-pressure boiler system developed by B&W has proved from operating experience to be the most economical for these service conditions, the company's vice president, S. T. Mackenzie, claimed. In the past four years, 16 of the new B&W units have been installed or ordered for utility plants. These units represent a total industry power plant investment of almost $1 billion, a generating capacity of over 6,450 Mw.

Operating results obtained with six units currently in service—one boiler each at American Electric Power's Philo, Breed and Sporn Plants; two units at Southern Cal Edison's Huntington Beach Station; and one unit at Baltimore Gas & Electric's Crane Plant—have proven four primary advantages of the Universal Pressure system. These include lower field construction costs, increased plant economy and availability and lower maintenance costs.

Mackenzie pointed out that B&W will continue to offer drum-type boilers for 2,000-psi service or above to meet special customer requirements.

HIGH-VOLTAGE TRANSFORMER at new laboratory is rated 150 kv (rms), has corona-free circuit to 75 kv (rms)

New Ceramaseal Lab Tests HV Bushings, Terminals

Ceramaseal, Inc, has opened a new high-voltage laboratory at its New Lebanon Center, N. Y., which will furnish test data as required on high-voltage bushings and terminals purchased from the company. The lab is also designed for development and quality control tasks within the Ceramaseal plant.

The new facility is equipped for testing corona start, flashover, dielectric breakdown voltages, and other related electrical properties. Equipment includes a Peschel Electronics 150-kv (rms) test transformer, with a circuit which is corona-free to 75 kv (rms) and a cathode ray oscilloscope-type corona detector. Transformer and detection circuitry are located inside a copper-screen enclosure to minimize interference effects. Tests are conducted in accordance with transformer specification MIL-T-27A.

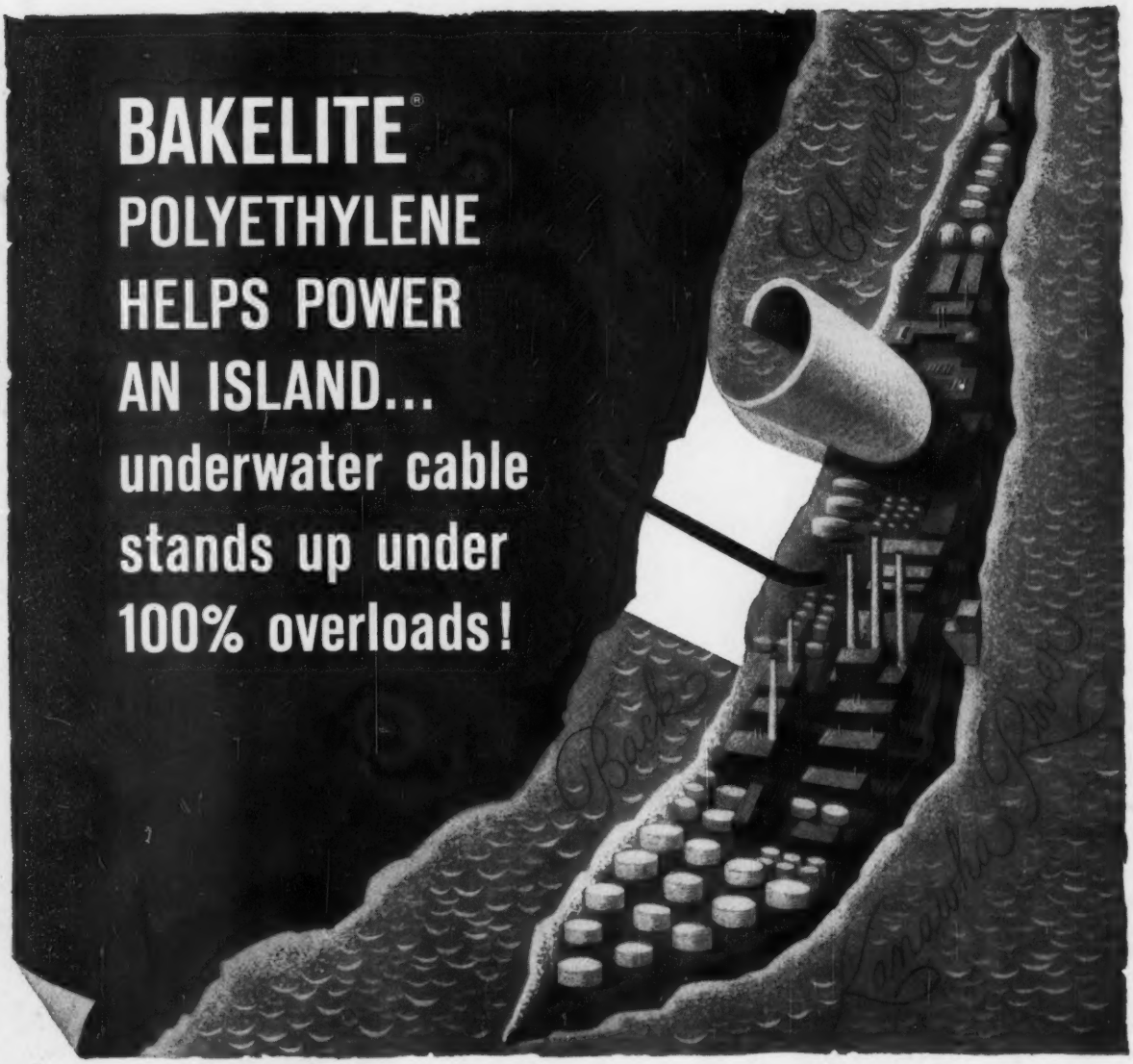
Ceramaseal says the laboratory has already proved beneficial, playing a major role in its development of a new line of high-voltage bushings specifically designed to provide very high corona-start voltages while operating in less space than previous types. It has also provided expanded and improved data for use in procurement of Ceramaseal products. Full details on laboratory service also are available from the company.

(*More Manufacturers News, p* 85)

A Westinghouse V-2 Disconnecting Switch advantage to you:
Teflon-coated bushings on live-side loaded bearings are almost frictionless, resist corrosion, never need lubrication, assure long life and less maintenance

For complete facts on V-2 disconnecting switches, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61016

BAKELITE® POLYETHYLENE HELPS POWER AN ISLAND... underwater cable stands up under 100% overloads!



Termination of power cable insulated and jacketed with BAKELITE polyethylene in a powerhouse cubicle on the mainland.

So. CHARLESTON, W. VA.: In 1956, Union Carbide Chemicals Company found an easy solution to bringing electric power from the mainland to Blaine Island. The submarine carrier: a single 15-KV load transfer cable, insulated and jacketed with durable BAKELITE polyethylene, laid along the bottom of a channel . . . without additional shielding.

Although continuously exposed to severe physical and chemical tests, the BAKELITE insulated-jacketed cable has provided failure-free 'round-the-clock power . . . despite wide load variations. Even a recorded 100% overload lasting several seconds didn't interrupt service or damage the cable.

When you have a power cable problem, it makes good sense to choose cable insulated and jacketed with BAKELITE polyethylene. Tough, durable, highly resistant to moisture and cracking, and an excellent low-loss dielectric, BAKELITE polyethylene is designed to provide optimum performance under severe conditions. Flexible and light in weight, polyethylene insulated-jacketed cables are easy to install, require no protective ducts or conduits.

Want more information? Write Union Carbide Plastics Company, Division of Union Carbide Corporation, Dept. **KL-43K**, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE **PLASTICS**

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation.

Testing Center Built For Guyed-V Al Towers

Michael Flynn Manufacturing Co, Philadelphia, Pa., is constructing a new test center for testing guyed-V aluminum towers. Reportedly the only facility in the US specifically built for testing guyed aluminum structures, the Flynn test center occupies an area of more than 50,000 sq ft and will be available to any utility for testing.

Designed for testing aluminum tower prototypes, the Flynn center will be set up to apply (1) transverse loads; (2) vertical loads; (3) longitudinal loads; and (4) broken wire loads representing a cable failure in service. Testing facilities now available at the center include a 135-ft tower for use as a load application system, and a 100-ft crossarm test bed to test the crossarms independently of the towers, and also a 100-ft test bed for testing tower legs. Under construction are five additional 120-ft towers that will also be used for testing guyed structures.

C. C. Armstrong, product manager of Flynn's power transmission tower division, says that a typical test in the Flynn facility will take about three days. He adds that the voltage range of the Flynn test center runs from 115 through 700 kv and that the center can test towers ranging in height from 50 through 120 ft. Armstrong also says that all power load tests are measured electronically with foil gauges and balancing bridges as opposed to using dynamometers which must be frequently calibrated.

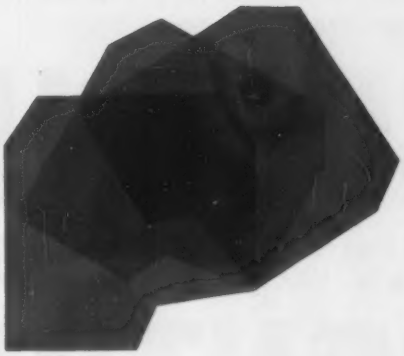
The Flynn test center is currently about 60% completed and contracts have already been awarded for the balance of the work. It is reported that the center will be in full test operation in two months.

GE Has New Facility for Sea Water Distillation

General Electric Co has begun operating a new laboratory at its Burlington, Vt., plant devoted solely to developing ways of extracting fresh water from the sea. It will be used to investigate and develop new technologies for converting salt water to fresh water and also to

(*Continued on page* 87)

A Westinghouse Metal-Clad Switchgear advantage to you:
Hinged arc chute simplifies inspection and maintenance of DH breaker



For complete facts on Westinghouse metal-clad switchgear using DH magnetic air circuit breakers, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61017

HOW TO SAVE

You can also gain greater speed and far greater flexibility from a major advance in control computers.

MONEY ON

Stored Logic provides these benefits, and the TRW-530 is the first control computer with Stored Logic.

COMPUTER

Stored Logic in the TRW-530 gives you economy in programming, economy in operating time, economy in memory requirements.

CONTROL

How can Stored Logic work for you? Our engineers will tell you why Stored Logic in the TRW-530 is the money-saving answer to control problems in steam station automation and automatic power dispatching. Contact one of our offices below.

TRW Computers Company
a division of
Thompson Ramo Wooldridge Inc.

LOS ANGELES 8433 FALLBROOK AVENUE, DIAMOND 6-6000, EXT. 2227 • CHICAGO 200 SOUTH MICHIGAN AVENUE, HARRISON 7-6348 • HOUSTON 1510 ESPERSON BUILDING, CAPITAL 7-5319 • NEW YORK 200 EAST 42ND STREET, MURRAY HILL 2-8488

seek ways to improve present desalting methods. The laboratory work is also applicable to brackish water.

One of General Electric's advanced techniques, the thin-film distillation process, is capable of demineralizing sea water to less than one part per million, while US public health standards require that impurities should not exceed 500 parts per million.

The laboratory program has two main objectives: (1) to investigate and develop advanced concepts, and (2) to obtain operating data on the company's new thin-film technique and evaluate new designs.

To support these objectives, energy is provided by two boilers. A 6,000-gal storage tank supplies sea water brought in from Rockport, Mass.

Cable, Engineering Package Offered Through Delta-Star

Insulated power cable for up to 28 kv is now available to utilities through sales facilities of Delta-Star Electric Division, H. K. Porter Co, Inc, in Chicago. It is being produced at the Ambridge, Pa., plant of National Electric, another division of Porter.

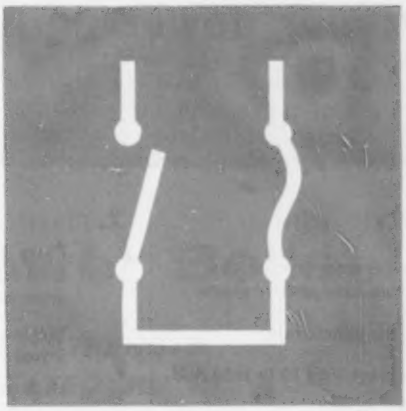
This arrangement permits Delta-Star to offer electric utilities a complete line of power and control cable plus power cable accessories which the division has been manufacturing for over 40 years. Accessory items include support systems such as expanded metal, new ladder-type cable tray (Ladder-Way), spool insulators, cable terminators (potheads) and plugs and receptacles.

MANUFACTURERS BRIEFS

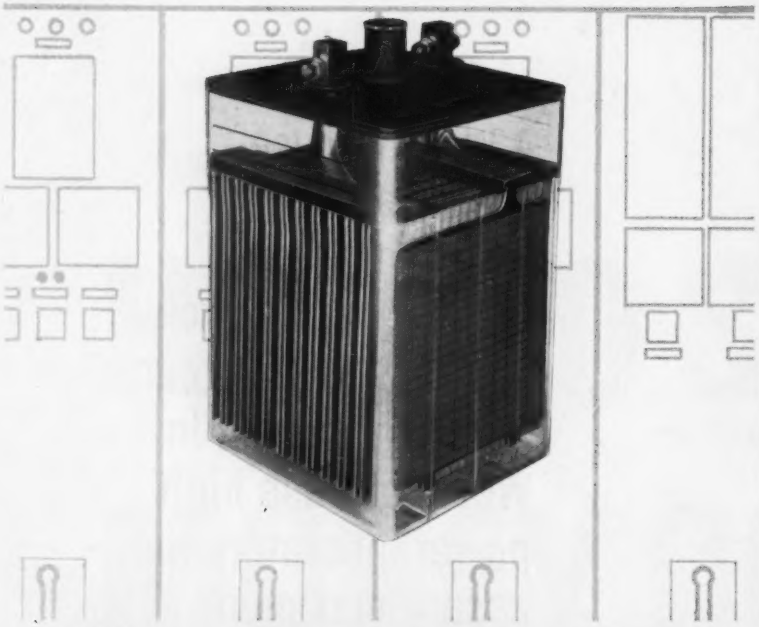
• **Federal Pacific Electric Co's** Swiss holding company has set up an affiliate company in Italy called **Federal Pacific Italiana S.p.A.** It will be engaged in production and sale in Italy of high and low-voltage electrical tools and machinery. Federal Pacific already has a branch in Germany.

• **Whitehead & Kales Co,** Detroit, has received the steel structure fabrication and erection contract for a 580-Mw turbine-generator unit

A Westinghouse Switchgear advantage to you:
DFS drawout switch and fuse switchgear is design-proved in Westinghouse high power laboratory to assure maximum service reliability



For complete facts on DFS drawout switch and fuse switchgear, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61018



What control battery is best for your power equipment?

Because batteries used in load centers, substations, and generating stations must be unusually reliable, the best battery is the one designed for such use. C & D has *two* complete lines of batteries designed and manufactured for power equipment use. They are:

1. PlastiCell* with

- Extra-life from extra-thick *triple insulated* positive plates.
- High one minute rate.
- 51 sizes covering 10 to 1650 A.H.
- Lightweight plastic containers.
- Lead antimony grids.

2. PlastiCal® with

- Extra long life (up to 25 years) from *triple insulated* lead calcium grids, in full float service.
- Watering required only once a year.
- High one-minute rate.
- 43 sizes covering 40 to 1650 A.H.
- Lightweight plastic containers.

Write for bulletins CP-539 and CP-540 for complete details and specifications.

AUTOCAL* Power Package Increases switchgear reliability

The combination of a C & D PlastiCal battery and an *AutoReg®* power supply is the perfect switchgear power package. C & D's outdoor unit shown here gives the same high performance as indoor equipment. The weatherproof package is trouble free, requires virtually no maintenance.

C&D BATTERIES
of Conshohocken, Pa.
DIV. THE ELECTRIC AUTOLITE CO.

Manufacturers of Slyver-Clad® Industrial Batteries • PlastiCell* and PlastiCal® Batteries for Communications, Control, and Auxiliary Power • Producers of AutoReg® Silicon Chargers and AutoCal* Charger-Battery Combinations

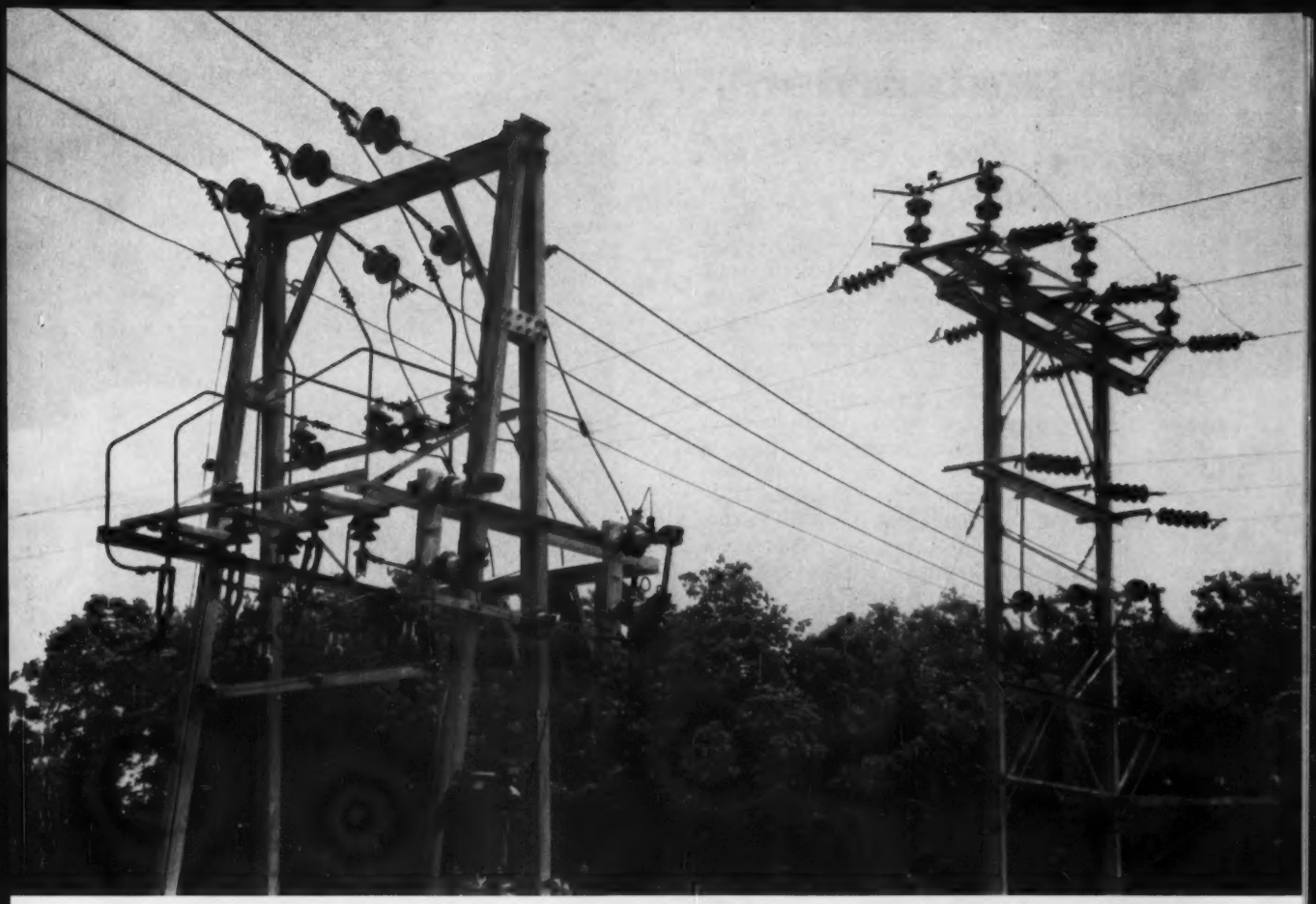
*Trademark

which is now under construction at Indiana & Michigan Electric Co's Tanners Creek Plant. The new unit will be the fourth at the plant and will more than double its total generating capacity to 1,105 Mw; total cost is estimated to be $73 million. About 4,000 tons of steel are involved. Reportedly, the Tanners Creek unit will be the largest ever built by an investor-owned electric utility. Its design calls for its operation at an expected heat rate of 8,500 Btu per kwhr—a new efficiency level for steam power generation.

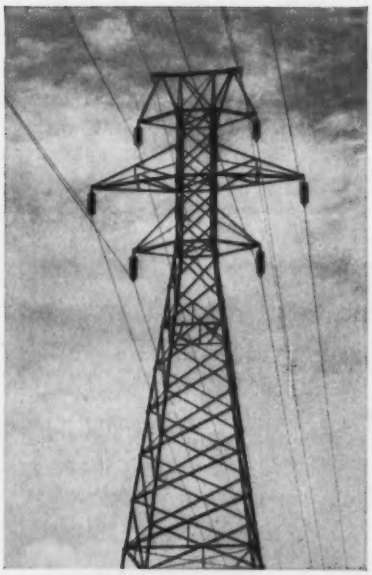
• **General Electric Co's** small integral motor department of Ft. Wayne, Ind., will be merged with its small ac motor and generator department of Schenectady, N.Y., Arthur F. Vinson, company vice president and group executive, has announced. Oscar L. Dunn, vice president and general manager of the motor and generator division, announced concurrently that Bryce W. Wyman will continue as general manager of the department. Headquarters of the department remain in Schenectady, with manufacturing activities in both Schenectady and Ft. Wayne.

• **S & C Electric Co** has broken ground for a new plant on a four-acre site near the Toronto International Airport. The company manufactures high-voltage circuit interrupting equipment.

• **Combustion Engineering, Inc,** has been awarded a contract by Consolidated Edison Co of New York for a steam generating unit which is reportedly the largest ever ordered. Known as a C-E controlled circulation steam generator, the unit will serve a turbine generator with capability of over 1,000 Mw—said to be twice the capacity of the largest boiler-turbine installation now in service. At full output, the steam generator will deliver 6,500,000 lb steam/hr to the turbine at pressure of 2,400 psi. The two furnaces will have a combined volume of 523,000 cu ft—equivalent to the volume of 40 average size houses. Design allows one of the furnaces to be shut down if desired, permitting the turbine generator to be operated at half of its full power output.



Bethalume Tower Bolts



STEEL FOR FULL STRENGTH . . .
BETHALUME-COATED
FOR MAXIMUM PROTECTION

For transmission towers and substation structures, Bethlehem's Bethalume tower bolts give maximum protection against corrosion . . . especially in highly contaminated industrial atmospheres. For the first time, this protection will last as long as that of the tower members. And, you get the corrosion-resistance of aluminum combined with the unbeatable strength of steel.

Coated by a hot-dip process, Bethalume bolts are compatible with both galvanized and aluminum structural members. In addition, Bethalume tower bolts are non-galling.

Let us give you the facts which back up these statements. Test results are now available. For more information call the nearest Bethlehem office. Or write to us in Bethlehem, Pa.

Steel

for Strength
. . . Economy
. . . Versatility

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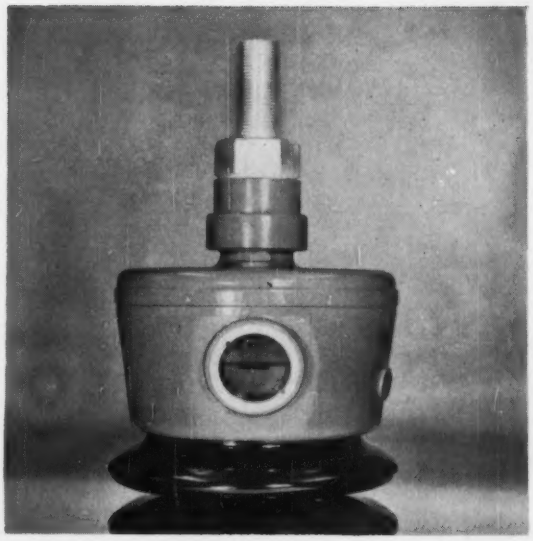
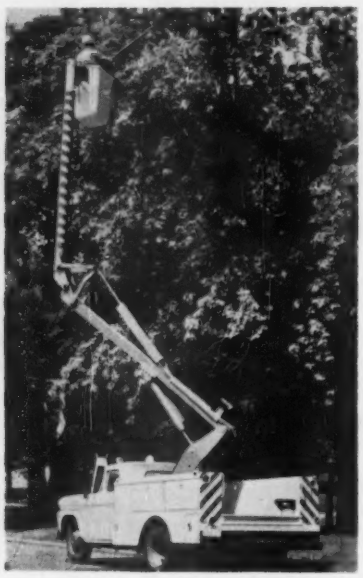
New Equipment

Bushing Sight Gauge . . .



. . . is window or porthole type, and replaces dial-type, magnetic gauge on bushings in the lower voltage range—(very high interrupting currents are said to cause inaccuracies in magnetic gauges). The POC and POC-A series gauges are being supplied on Lapp-ASA Standard condenser bushings, 15 kv-69 kv. Each gauge consists of a 2-in., high-strength, tempered glass lens mounted flush in a fully sealed, leak-proof mounting ring on the front of the oil reservoir. The glass is tinted to filter the sun's rays, prevent deterioration of the oil. A baffle directly behind the glass limits amount of oil in contact with the glass and retains a small float which indicates, at a glance, the true level of oil.
Lapp Insulator Co, Inc, Leroy, N. Y.

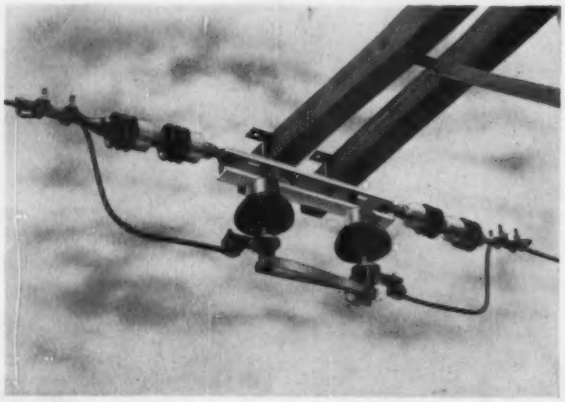


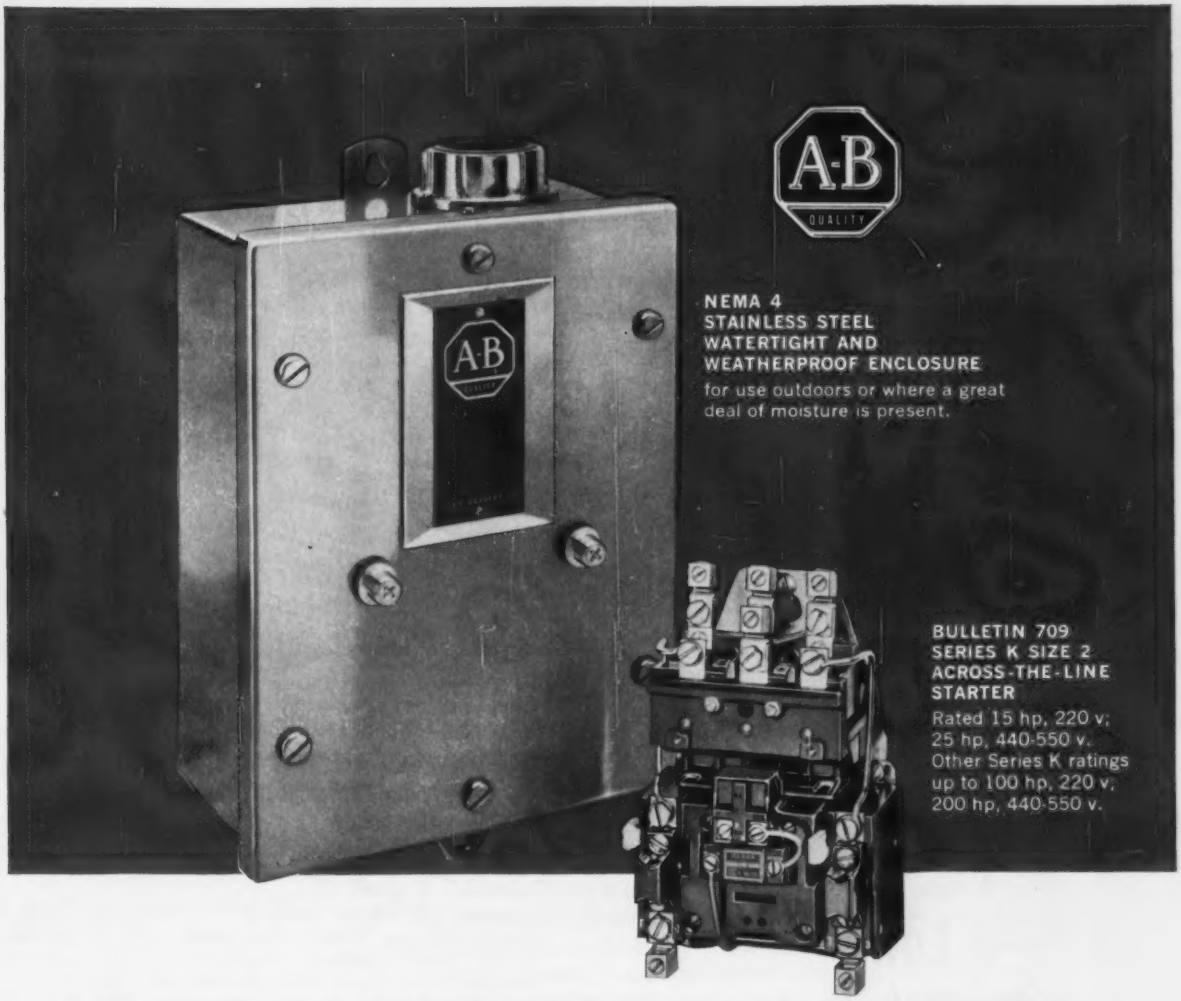
Aerial Equipment . . .

. . . enables one man to reach readily over parked and moving cars and between telephone and power lines. Some typical uses include work on mid-span cable, insulator inspection, transformer re-fusing, maintenance and installation of cables, street lights and signs. The unit's Spirex outer beam and molded Fiberglas basket are insulated to provide protection from high-voltage lines. Hydraulic remote controls of "The Little Guy," for operating the outer and inner beams, are located beside the basket and on the mast. The unit rotates 370 deg . . . and continuously, if desired. All movement is powered by a heavy-duty pump driven by a power take-off on the truck transmission. Three Series ABS sizes are available with ground-to-basket-floor heights of 30, 32 and 35 ft. Torsion bars and springs eliminate outriggers of any kind.
McCabe-Powers Body Co, St. Louis 15, Mo.

Poletop Disconnect . . .

. . . with extruded "bulb-channel" aluminum base is one-third the weight of comparable steel bases. The type M2A disconnect is said to offer maximum resistance to corrosion while the "bulb-channel" shape reportedly gives the necessary rigidity and strength required during opening and closing of the switch blade. Insulators on the M2A have the same characteristics as other distribution equipment. The insulator caps and pins are made of high-strength aluminum alloy resulting in additional weight-reducing and corrosion-resistant advantages. The switches are available with voltage ratings of 7.8, 15 and 27 kv, 200 and 400 amp.
A. B. Chance Co, Centralia, Mo.





The New Size 2 Motor Starter Uses ONLY HALF the Space, and Yet— It's good for MANY MORE MILLIONS of OPERATIONS

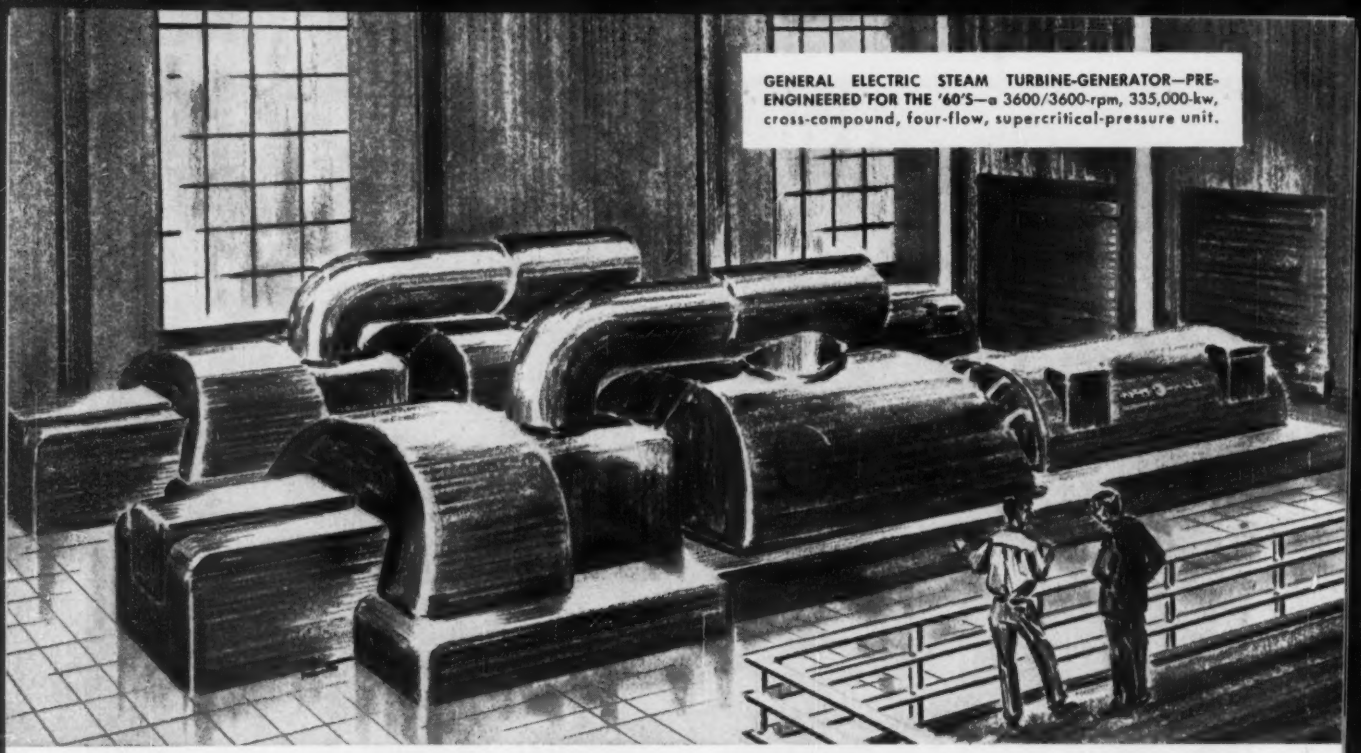
Impossible—you may say! But, it's true. You'll find unbelievable reliability and much longer, trouble-free life packed into these new, surprisingly small Allen-Bradley Series K starters. For instance, the above open-type Bulletin 709 Size 2 uses 51.0% less panel space than the previous Bulletin 709 starter—and it, too, was thought of as a small starter! Higher ratings in the new A-B line offer similar space savings.

You're certain to be interested in many other Series K features, such as the new weld-resistant double break contacts of cadmium oxide silver . . . new built-in "extra" interrupting capacity . . . new cushioned high-efficiency magnet . . . new pressure molded coil . . . new permanent air gap . . . new trip-free and tamperproof solderpot overload relays. Then, too, there's the new modern family of enclosures for every operating condition. Styled by Brooks Stevens, they give every installation an eye-appealing, business-like beauty. For more details please write for Publication 6100: Allen-Bradley Co., 1327 S. First Street, Milwaukee 4, Wisconsin.

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control



GENERAL ELECTRIC STEAM TURBINE-GENERATOR—PRE-ENGINEERED FOR THE '60'S—a 3600/3600-rpm, 335,000-kw, cross-compound, four-flow, supercritical-pressure unit.

Lower Capital Costs, Higher Generating Efficiency

Potomac Electric Power Company will construct a steam-electric generating plant substantially more efficient than their Dickerson Plant—the country's most efficient in 1959

The new 670,000-kw Chalk Point Generating Plant in Prince Georges County, Maryland, will be Potomac Electric Power Company's latest entry in the continuous struggle for more and more efficient power generation. In the 1959 Federal Power Commission Report S-143, PEPCo's Dickerson Station was ranked the most efficient electric utility plant in the nation—and Chalk Point will be considerably more efficient.

Chalk Point will represent a 41% increase in PEPCo's generating capacity—boosting it to 2,313,000 kilowatts by 1965. By careful selection of power plant equipment incorporating new engineering innovations, PEPCo is taking this bold, forward step to help keep power costs low for its estimated market of 1½ million people.

Significant in achieving Chalk Point's efficiency goal are the two General Electric 335,000-kw, cross-compound, four-flow, supercritical-pressure, steam turbine-generators, designed in anticipation of our nation's ever-increasing need for low-cost electric power.

Potomac Electric has pioneered with General Electric in the development of these two units, the first of this advanced design pre-engineered for the '60's.

"This new, supercritical-pressure, steam-electric power plant will help us realize not only lower per-kilowatt capital costs, but also much higher generating efficiency," states L. W. Cadwallader, Potomac Electric official. 244-13

Progress Is Our Most Important Product

GENERAL ELECTRIC

Electrical World

NOVEMBER 6, 1961

Management Newsletter

Editor's Note: The following is a condensed version of an address delivered by Brig Gen Herbert D. Vogel, USA (Ret), chairman of the board of the Tennessee Valley Authority, before the Procurement-Management Conference, University of Dayton, Ohio, Oct. 13. *These remarks are presented here with the hope that they will engender a frank discussion of a subject of immediate concern to the electrical industry.*

Competition and Administered Prices

Whenever the subject of administered pricing is raised for discussion, particularly in a forum such as this, interpretations are needed to clarify the meaning of the term and to limit its application. This is a job for the experts—the economists who have made a comprehensive study of our competitive enterprise system and its effects on our national life. We might start out, therefore, by considering some comments made before the Senate Judiciary Committee a few years ago. Since these represent the more liberal viewpoint, they may be considered as probably not unsympathetic to the interest of the buying public.

Dr Edwin G. Nourse, former chairman of the Council of Economic Advisers:

> It is my considered opinion that the economic institutions and business practices described as administered pricing grow naturally and properly out of the conditions of modern industrialism and that they may be so used as to promote both economic growth and business stability vigorously and consistently.

Dr Gardiner C. Means, economist for the Committee for Economic Development:

> Administered prices represent a way of doing business that leads to greater efficiency and higher standards of living. We could not have our big, efficient department stores and mail-order houses if prices were not administered. Without this method of pricing, big, efficient industry would find it almost impossible to operate. Administered prices are an essential part of our modern economy.

Dr John Kenneth Galbraith, former Harvard economics professor:

> . . . given the basic circumstances of our economy, there will be a large amount of price administration. In the past, in my own view, a great deal of time has been wasted in hoping that this control of prices might somehow be expunged. I am arguing that it is inevitable, that we will always have it and that the thing to do is to make it serve us rather than to eliminate it. As long as we have a steel industry, the steel firms will exercise considerable control over the prices of steel, and we might as well face it. The thing to do is to see that that control is exercised in the public interest rather than against the public interest.

Here we have three men, noted and respected in their fields, who express a large measure of agreement on the subject of administered prices. They agree that administered prices are here to stay and I concur in this view. The more basic question is whether our businessmen, administering prices under the freedom of

our economic system, abuse that freedom in a manner contrary to the public interest. There is a tendency in all human affairs, where ethical judgment is involved, for values to become distorted little by little. Those actions which are moral and right will be supplanted first by those which are just "within the law," then by those which a sharp lawyer can defend, and finally by those that are not only immoral but illegal. As an example we find the president of an electrical manufacturing company saying to the *Wall Street Journal* in defense of collusion among electrical companies:

> No one attending the gatherings (in the electrical controls industry) was so stupid he didn't know (the meetings) were in violation of the law. But it is the only way a business can be run. It is free enterprise.

Administered prices can have an important effect on the public interest. An extreme, but nevertheless practical, example is the price and production tradition which has grown up in some European countries in contrast with that in America. European businessmen long ago chose to keep prices high and make a large profit on each unit of production while keeping the over-all volume of production low. The opposite has been the practice of American industry. Generally speaking, it has been our business tradition to establish a price which would stimulate a large market, allow a smaller unit profit, but make a larger over-all profit as a result of the larger volume.

In comparing the American and the European experience, however, it is sufficient to point out that the broad differences between them has been one of the factors enabling industry in the United States to grow to enormous size with gigantic production capability. This "bigness" in industry has contributed both strength and efficiency to the national economy, favorably affecting consumers and their sustained ability to buy. It has also provided a great industrial reserve, lending military strength to the country. Bigness in business, like administered prices, also is here to stay. To pulverize it into many small industries would do a disservice to consumers, weaken the economy, and impair our defense capabilities.

Yet industrial and business bigness and the convenient technique of administrative pricing are not without their dangers. Big industry has given rise to big labor. And the hugeness of both has helped bring about big government. I was much impressed with Dr Nourse's succinct description of the problem that has been created.

"We are now confronted," he said, "with the pressing problem of seeing to it that big business does not become managerial domination, that big labor does not become union dictation, and that big government does not become authoritarianism."

We have seen events in the last year or so, involving TVA directly and intimately, which have dramatized rather grimly the dangers inherent in the practice of administrative pricing. In 1957, TVA received bids for the purchase of a 500,000-kw turbogenerator that was to be the largest in the world. The contract was awarded in good faith that the competitive free enterprise system was at work. TVA paid $16,112,000 for that machine, or the equivalent of $32.22 for each kilowatt of power capacity.

But then it turned out that the bids offered were not competitive. The federal grand jury meeting in Philadelphia found that there were meetings among manufacturers which produced agreements as to which one would receive the contract. The well-known antitrust actions followed.

Following purchase of its first 500,000-kw machine, TVA brought a very strong element of competition into the turbogenerator picture. We noted that the price of these machines had increased more than 50% since 1951 while the wholesale price of all commodities had gone up only about 5%. In this situation, when the time came to order another large generating unit we invited bids from outside the United States. A great hue and cry was raised by the American companies when the award went to an English firm. Although the two American

concerns were almost 50% higher in price, an attempt was made to show that low foreign wages accounted for the difference. It was suggested that TVA was taking bread from the mouths of American workmen.

TVA demonstrated that the wage differential could not possibly account for as much as half the price advantage offered by the British firm. This difference, it was shown, was amply covered by the import duty on the machine, not to mention the other preferences granted under the Buy-American Act. But the real demonstration of the extreme administrative flexibility in American turbogenerator prices was by the companies themselves. To their credit, they buckled down to the job of competing with the manufacturers overseas. One of the significant results was the award early this year of a TVA contract to one of the same companies involved in the antitrust suit for a turbogenerator which will be furnished at a unit price of $18.20 a kw. This is a generator which is 80% more powerful than the one bought in 1957. It is being bought from the same company. Yet the unit price is 40% less. The injection of the competitive factor helped bring about this substantial price cut.

Here is a clear-cut demonstration of the range of managerial judgment which enters into the setting of "administered prices" in turbogenerators, and of the impact upon the public interest, depending on how that judgment is exercised. It is incumbent on the leaders of industry to have a keen appreciation of their responsibility to the public—a responsibility with respect to company policies, and actions stemming from those policies. It is a responsibility which is more than mere self-discipline; it includes the leadership necessary to maintain the highest ethics and standards in industry.

Last fall the board awarded a $72,000 contract for insulators to a Japanese firm. We took unusual steps in connection with this contract. Five American companies had submitted identical bids, and the foreign company was obviously low, even considering tariffs and the Buy-American Act. But the cost of inspection made the purchase a marginal one in the board's judgment. We rejected all bids, and I wrote personally to each manufacturer urging that they enter their best competitive prices when the contract was readvertised. Yet identical bids were submitted a second time. The Japanese firm was still low and received a substantial contract.

The aftermath of this Japanese competition was quite interesting. For years the domestic price of this type of insulator was the same for any number of units. American manufacturers have now announced a price reduction of 6% for less-than-carload lots and 10% for carload lots. And one manufacturer has announced a new insulator having slightly less strength but equal in electrical characteristics with a price reduction of nearly 25%.

TVA's purchases of transformers have also had an interesting history with respect to foreign competition. Our first invitations to foreign manufacturers were posted in 1955 and from then until 1958 European companies were successful bidders on all of our power transformers except for small sizes. Domestic companies have shared TVA transformer awards since 1958, and in 1961 no power transformer award has gone to a foreign competitor. In some instances, the American firms have quoted as much as 40% under their so-called "book prices."

We are watching now to see whether the American companies may be drifting away from their competitive pace. In June, when we took bids on a new allotment of transformers, they increased their bid prices over those quoted in January, while the one English manufacturer did not change his price. Since 1958 when they began competing in earnest with European manufacturers, American makers of transformers have increased their prices from 30 to 45%. In the same period two British companies have reduced their prices slightly. The future will tell whether American industry is again pricing itself out of a market.

In spite of the recent antitrust conviction in the electrical industry, TVA continues to receive identical bids from many companies on many purchase items. These

include ACSR cable (for transmission lines), carrier current equipment, transformers, lightning arresters, insulators, grinding balls, condenser tubing, and power capacitor units. A slight deviation from this pattern occurred recently when one large aluminum company was awarded the largest contract TVA has ever granted for ACSR cable—nearly $4¼-million worth. This concern bid fractionally lower than its competitors, but we are not convinced that a single instance breaks the long established pattern of equal bidding in this industry.

One of the steps TVA has taken in an effort to end the practice is to require each bidder to sign a certificate that its bid has been arrived at without collusion, and that the contents of its bid have not been disclosed to other companies.

It is not for me to say whether the practice of identical bidding is legal or illegal. It is justified by the industry on the ground that the prices quoted are "catalog" prices on common "shelf" items. And, of course, identical prices are not in themselves a presumption of guilt under the antitrust laws. But whatever the verdict may be with respect to the law, these are practices that should not be condoned. They are an abuse of the freedom allowed by our economic system. They represent shortsighted business leadership, for they destroy incentive to improve the product or its production. They are monopolistic, tending to concentrate rather than diffuse economic power.

These are times when world economic conditions require that American business and industry use their vast array of skills, their fine traditions of business competition, and their large unhindered continental market to trim off fat and become more efficient. This they must do if they are to compete successfully against the growing industrial capabilities of Europe, Japan, and the Soviet Union. These are times when our own national economy demands a deep concern for the interests of consumers. Consumer-oriented pricing can be an effective weapon against rising living costs. It can help provide the steady growth in consumer buying which is essential if we are to provide employment for our growing labor force.

Competition has been accepted as an indispenable ingredient of our economic system not only because it contributes to the consumer interest but because we have found that it contributes vitality to the industrial process. We often use the term "free enterprise" without thinking that the more accurate and more descriptive term is "free *competitive* enterprise."

Administered pricing must be conducted with a keen awareness of the public's interest as a consumer. It must be used with self-restraint or it will invite governmental restraint. It must be conducted with an awareness of the whetstone of competition so necessary in keeping American industry sharp, alert, and resilient. These qualities are essential to our commercial, economic, and defense needs in a world that is changing swiftly and drastically.

* * * *

As head of an organization that last year spent some $138 *million on materials and equipment, Gen Vogel holds a commanding place in the electric utility equipment marketplace. Moreover, he is often outspoken on the need for increased competition in the marketplace. In* 1959, *TVA, incensed with identical bids, threatened to buy from foreign manufacturers if these bids didn't cease. TVA carried out the threat and at the same time brought the electrical equipment industry under the scrutiny of Sen. Estes Kefauver's Antitrust & Monopoly Subcommittee. Perhaps in justification for these moves, Gen Vogel likes to tell the story of the domestic turbine division manager thanking him for buying a foreign turbine-generator because only then did the domestic company's top brass release money for a much-needed cost-cutting program. Gen Vogel,* 61, *was appointed chairman of TVA in* 1954 *by President Eisenhower. His term expires in* 1963. *A graduate of West Point and holder of three advanced degrees including a doctorate in engineering from Berlin Technical University, Gen Vogel served with the US Army Corps of Engineers before* 1954. *Between* 1952 *and* 1954, *he was Southwest Division engineer.*

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Sixteen miles from Dushore, in northeastern Pennsylvania, Pennsylvania Electric Company has installed its first 4000 KW Electro-Motive Diesel Peaking Plant to provide a reliable secondary source of power, and to improve service continuity to customers in the immediate area.

PEAKING POWER—In addition to providing area protection for Penelec, the Electro-Motive Plant will also operate automatically and unattended as a peaking power generator during hours of greatest demand. It is remotely controlled from Penelec's East Towanda Dispatching Center 29 miles away.

AUTOMATIC DEAD-LOAD PICKUP—In the event of an emergency power failure on the line, the Electro-Motive Plant will automatically start, come up to full speed, synchronize and pick up the area load, within 90 seconds. It will continue to provide emergency power until the line failure is corrected and will then automatically shut down.

POINT-OF-LOAD POWER—Because the Electro-Motive Plant operates automatically and unattended, Penelec was able to place it conveniently at the point of load demand for maximum savings in generation and distribution equipment investment. The compact, portable Electro-Motive equipment operates quietly and smoke-free, making it a good neighbor.

ADAPTABLE TO ANY SYSTEM—The inherent design characteristics of the Electro-Motive equipment on the Penelec system that make it

Diesel Plant for area protection

ideal for area protection and peaking power, also make it well suited for many of your system requirements:

- fast start for spinning reserve
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Available in units from 2000 KW to 10,000 KW, the Electro-Motive peaking equipment line contains both Diesel and dual-fuel plants that permit matching the plant to exact requirements for the most economical and efficient operation at the lowest investment. Ask your Electro-Motive representative for complete details.

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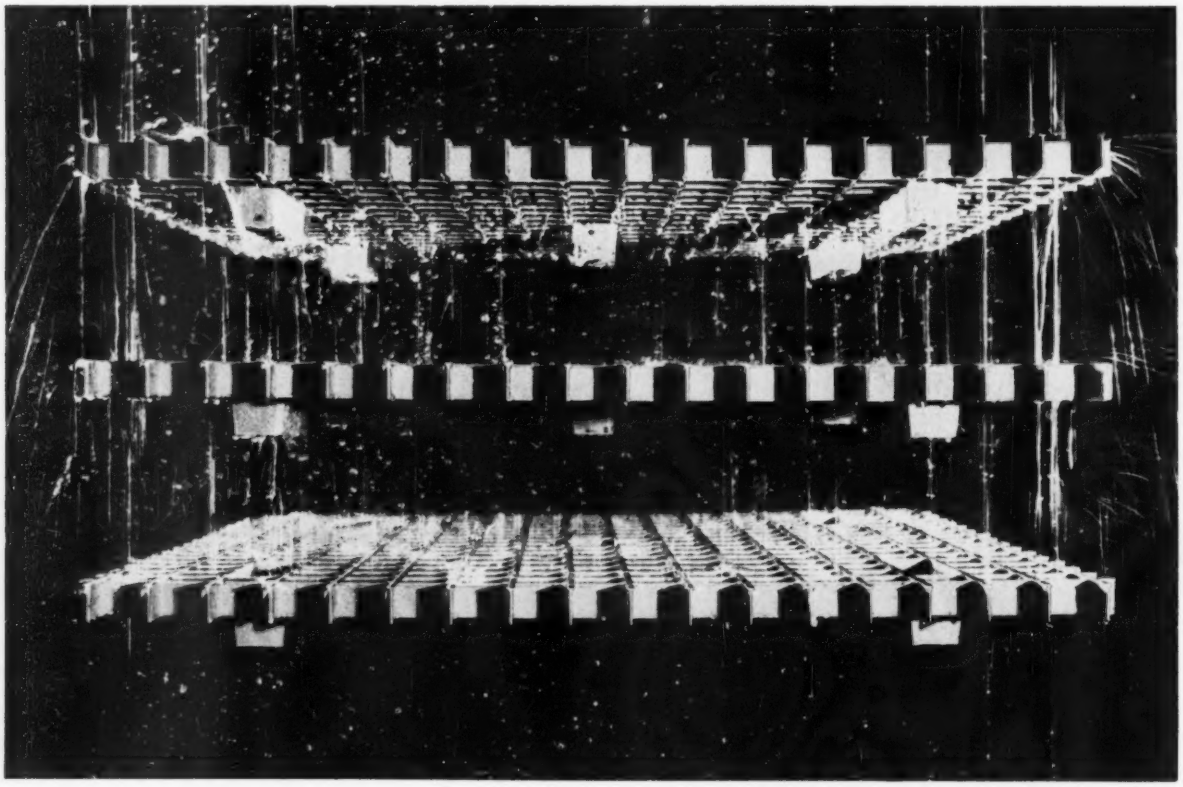

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SELLING BRIEFS

A method of breaking rocks electrically has been successfully tested by the Montana School of Mines and Westinghouse Electric Corp. Equipment used consists primarily of a radio-frequency generator similar to a small radio transmitter. Instead of sending out its power through the usual antenna, the power of the generator is directed through wires to a rock. The concentrated high-frequency current heats a path through the rock which expands more than the unheated areas. This differential expansion causes the rock to crumble. The electrical approach is "decidedly safer," faster and simpler, according to the head of the school's electrical department . . . **A "Guarantee of Satisfaction"** policy on kitchen-laundry appliances has been instituted by the Hotpoint Division of General Electric Co. If a customer is not satisfied with her appliances and notifies the dealer within 90 days after purchase, the appliance will be replaced at no cost to the customer . . . **A swing** to fair trade on major electrical appliances in the metropolitan New York area indicates that fair trade is "very, very much alive," according to Maurice Mermey, director of the Bureau of Education on Fair Trade. This statement was prompted by the announcement that General Electric Co's sales and distribution department will fair-trade home laundry equipment, dishwashers and color TV in New York, while Westinghouse Appliance Sales has instituted a fair trade program for selected major appliances, television, and stereophonic phonographs in New York and New Jersey . . . **Planning guides** and sample materials for National Electrical Week 1962 have been mailed to 5,000 industry groups. Theme for the Week will be "Electricity Powers Progress." Further information: National Electrical Week Committee, Suite 306, 407 N 8th St, St. Louis, Mo. . . . **More and more** Florida builders are adopting heat pumps for residential construction, according to Bryan Hungate, central systems manager for Major Appliances, Inc, a Miami distributor. Many homeowners are also replacing room units with central system heat pump units, he said.

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Power For America Every year more and more electric power is pumped into the arteries and veins of America. Under control this genial genie does the work that gives the nation its growth and strength. Out of control, it becomes a monster, full of terror and destruction.

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Good Chosen Indiana Utility Vice President

GOOD ▶

Allan P. Good has been elected vice president and controller of Northern Indiana Public Service Co. He succeeded Walter A. McDonough who retired as vice president, controller and a director after almost 40 years with the utility. Carl D. Rees, first vice president, was named to succeed McDonough as a director.

Good has been with Northern Indiana PS since 1926. He was appointed assistant controller last year.

McDonough will continue to serve the utility in a consulting capacity for the next five years.

PERSONAL BRIEFS

E. L. White has been named to assume the duties of Bonneville Power Administration chief engineer until a replacement is chosen for **Eugene C. Starr,** who recently resigned from the post. Starr, who resigned for personal reasons after 22 years with BPA, was the 1958 recipient of the Department of Interior's award and gold medal for distinguished service to the government in the electrical engineering and nuclear power fields.

Central Illinois Power Co has appointed **Charles F. Wayham** as industrial department manager in the Springfield general offices.

Volney J. Cissna has retired as staff engineer in the transmission system planning branch of Tennessee Valley Authority. He had been with TVA 12 years and previously served with Electric Bond & Share Co and its subsidiary, Kansas Gas & Electric Co.

Massachusetts Electric Co has named **Richard L. Noble** as local manager at Athol. Also within the New England Electric System, **Edward Kaplan** became executive assistant to Vice President **Chandler W. Jones,** in Boston. **Walter C. Shaw** was named manager of commercial and industrial sales for the south shore division of Massachusetts Electric. **John T. Whitehead** was promoted to superintendent of distribution engineering for Suburban Electric Co. **David Z. Breck** became engineer in charge of the New England Electric System district engineering office in Lynn, succeeding the late **D. P. Ierardi.** Merrimack-Essex Electric Co named **Donald G. Shaw** as distribution engineer.

Detroit Edison Co has promoted the following: **George J. Brown** to manager of construction; **Arthur H. Clark** to assistant to the general superintendent of construction and maintenance, and **Donald A. Wells** to maintenance engineer of power plants.

Preston F. Ryan has become manager of the St. Louis sales office of Wagner Electric Corp's electrical apparatus division. **Herbert P. Pillisch** was named manager of the division's Indianapolis office.

Harold F. Smiddy, General Electric Co vice president-management consultation services, will retire in November. The organization components which have been reporting to Smiddy will be reassigned among the company's relations and accounting services.

Kerrigan Iron Works Co has appointed **Tom Barney** as sales manager of Kerrigan lighting products.

Charles D. Michaelson has been appointed vice president of mining and **Gordon B. Russell** has become treasurer and comptroller of Kennecott Copper Corp.

Walter F. O'Connell has been elected president and chairman of United Nuclear Corp, succeeding **William Chapman Foster.** Foster was appointed director of the newly created US Arms Control and Disarmament Agency.

Allis-Chalmers Manufacturing Co has appointed **Peter F. Lovato** as manager of product sales for power, instrument and control transformers at the A-C Pittsburgh Works. **R. E. Goodwill** became sales manager for the Norwood (Ohio) Works electrical department, succeeding **J. F. Fenske,** who became motor sales manager in the Pacific region.

Robert L. Borchardt has become national service manager for Motorola Communications & Electronics Inc. **Robert Peth** was named manager of engineering for mobile and portable communications products in Motorola's communications division.

Radio Corp of America has named **D. C. Arnold** chief engineer of the aerospace communications and controls division, defense electronic products. **Lawrence M. Falk** became manager of support engineering in the data communications and custom projects department of the corporation's electronic data processing division.

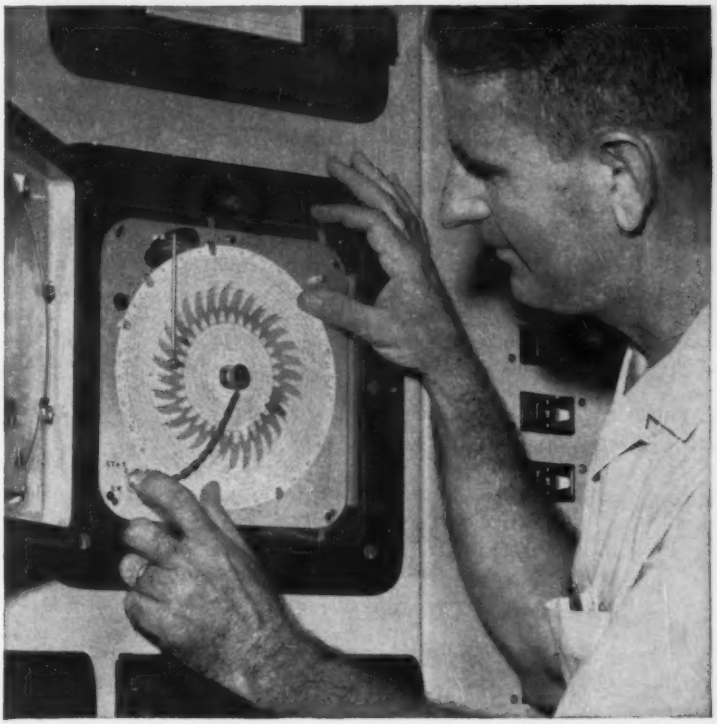
Theodore E. Jasin has been appointed general traffic manager of Babcock & Wilcox Co's boiler division.

(*More News About People, p* 104)

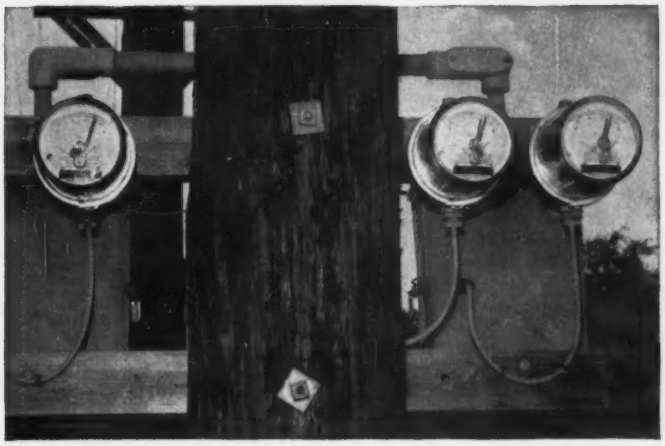
Planned System Measurement in Action at LP&L

. . . The system measurement program developed by Louisiana Power and Light Company is an excellent example of how *planned system measurement* can improve system reliability with a minimum investment in equipment and engineering time. The company's standards call for Sangamo CCW/CCVAR Lincoln Graphic Meters at each substation to give readings of KW and KVAR loading. The use of these meters provides distribution engineers with information for placement and switching of power capacitors and, in addition, substation engineers obtain continuous records of KW and KVAR loading on power transformers. Both power factor and kva at any time can be easily calculated from the one chart without reference to other station meter readings.

The new CCW/CCVAR meter averages the KW load for 30 minutes, then averages the KVAR load for 30 minutes, to automatically produce a reading of each load once every hour (note chart). A switch arrangement permits the meters to measure only KW or KVAR when desired. CCW/CCVAR meters are available with chart speeds of 8, 16, or 32 days.



How Louisiana Power & Light Company improves substation performance and virtually eliminates voltage complaints



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Complaints about voltage on the LP&L system have been virtually eliminated through a major program which included substation regulation and the installation of hundreds of voltage regulators two or three miles beyond substations to maintain adequate voltage levels in service areas located past the load center.

The utility has adapted pole-top regulators to make it possible for meter readers to inspect and report monthly on the regulators' operation. Sangamo Type V4S Lincoln Voltmeters were installed with each regulator to continuously monitor the voltage operating range. The indicated voltage values are read and recorded on meter readers' regular rounds and the minimum and maximum pointers are re-set in preparation for the next monitoring period. The data gathered is then sent to the engineering department for study.

SANGAMO ELECTRIC COMPANY *SPRINGFIELD, ILLINOIS*

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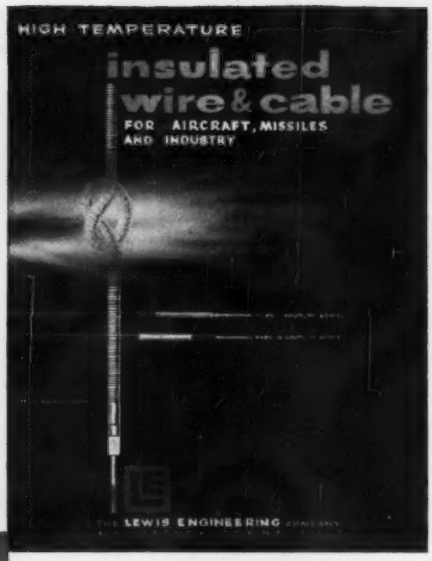

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SALES ASSIGNMENTS

COMPANY STAFFS

Riley Stoker Corp has appointed Joseph F. Marotta sales engineer at the New York office of the corporation and its Union Iron Works division.

Electric Storage Battery Co has named John S. Harbison marketing manager of the automotive division. B. A. MacLeod became Willard sales manager, with headquarters in Cleveland. R. A. Worrell was named Exide western region sales manager.

General Telephone & Electronics Corp has a new sales manager for the Philadelphia district of Sylvania Electric Products Inc division's lighting products division. H. Page Woodbury succeeded E. Barry Colby in the post. Colby was promoted to marketing manager for industrial-commercial sales. Hal L. Simmers became sales manager of the lighting products division's Pittsburgh district.

I-T-E Circuit Breaker Co has made Charles L. Roberts manager-power apparatus group for the Minneapolis district office.

S&C Electric Co has appointed Russell A. Erickson second sales engineer for Texas, joining John Schwenke at S&C's Dallas office in the Fidelity Union Life Building.

M. W. Kellogg Co has named Robert S. Page as engineering sales representative for the power piping division. He is assigned to the New York sales office.

Federal Pacific Electric Co has appointed Arch T. Hoyne as Midwest district sales manager for Cornell-Dubilier Electronics division.

Union Carbide Corp has chosen William O. Malone as technical representative in the south Atlantic sales region of Union Carbide Plastics Co division.

REPRESENTATIVES

Penn-Union Electric Corp has appointed Delta Materials Inc as its sales agent in Louisiana and Mississippi, and Mid-South Associates as its sales agent in Arkansas and the western part of Tennessee.

G&W Electric Specialty Co has named C. B. Anderson Electric Co as its sales representative in Oklahoma.

(*More News About People, p* 106)

Here's the bulk of your programming done– a SURE* benefit to IBM 7070 customers

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MERGE & SELECT	BILL PREPARATION
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SEPARATE & EDIT	REVENUE & STATISTICS

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Crapo Galvanized Steel Strand is available in three weights of coating, Class A, B and C. Class B has twice the zinc by weight per square foot of wire surface as Class A; Class C has three times that of "A."

Contact the **Crapo** Galvanized Steel Strand distributor near you for prompt shipments from his stock or from our mill.

INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana

VanDervort to Head Power Production

Sierra Pacific Power Co has named Richard K. VanDervort to be in charge of all power production facilities. He will also be responsible for considering the desirability of nuclear generation.

VanDervort is coming to Sierra Power from New York State Electric & Gas Corp where, for the past two years, he has worked exclusively in the field of nuclear energy for generation.

OBITUARIES

At Philadelphia Electric Co, **John J. Natale,** 66, retired manager of customers' accounts, has died. **Samuel G. Grant,** 56, Ardmore office manager, and **John R. Vorndran,** 75, construction division employee and 47-year company veteran before he retired in 1957, have also passed away . . . **Thomas O. Russell,** 80, chief engineer of the Oregon Public Utilities Commission from 1935 to 1942, has recently died. **Robert N. Miers,** 59, consultant for Allis-Chalmers Manufacturing Co's thermal power department for the past year and previously manager of the steam turbine department, has passed away.

Unify Electric Space Heating Selling

(*Continued from page* 61)

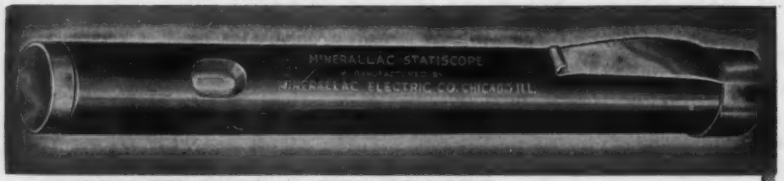
"I can see, however, because of the trend toward interconnected electric systems which cross the borders of several states, the strong presumption of greater federal regulatory powers. Such a step may be necessary if interconnected systems are to be fully efficient and meet the public need."

Aiken, discussing political and economic trends, aligned himself on the side of competition, "which is responsible for most of the world's progress.

"New England now leads the nation in the economic development of atomic power," he said. "You people are already producing 5% of the area's need for electricity at the Yankee plant.

"I do predict, however, that, when 1970 rolls around, considerably more than the present 5% of our electric energy capacity in New England will be supplied by nuclear reactors. I also predict that further increases in the price of residual oil will give a substantial impetus to this development."

The council elected Raymond A. Gibson, Hartford Electric Light Co, as president, succeeding Albert A. Cree, Central Vermont Public Service Co. New vice president is Charles Avila, Boston Edison. A. J. McNulty remains treasurer.



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EEI Head Cites Task

Fleger urges Indiana meeting: Talk up on public role

Philip A. Fleger, president, Edison Electric Institute, recently told the Indiana Electric Association at French Lick, Ind., that the electric industry must get across to the public that it is fully able to meet the country's power needs.

The public must be told that the industry will spend $140 billion for new plant in the next 20 years and will bear its full share of the cost of government, an estimated $100 billion in taxes, he said, adding that about 50% of those taxes will be federal.

Doyle Sees Challenge

Selling the idea of private enterprise in the power business remains a supreme sales challenge for the whole industry, said R. E. Doyle, IEA president. The industry, he said, must avail itself of every opportunity to plead its case before the public, elected representatives, and regulatory commissions.

Doyle suggested that the public responds quickly to any threat to its pocketbook, and that its apathy may be broken down by relating government-subsidized power to increased payroll deductions and the possible extinction of a company as an employer.

Warns on Inflation

When personal income taxes exceed 20 to 25%, government resorts to currency inflation to defray deficits, said Leonard E. Read, Foundation for Economic Education. He noted that the government take in personal income has increased in 120 years from 2 to 5% to about 35%.

History shows, he said, that "creeping" inflation has always preceded "galloping" inflation.

First Assistance Project Set

First technical assistance project to be approved by the Area Development Administration is a $45,000 grant to the Corps of Engineers for a study of Rend Lake—a proposed industrial reservoir — in southern Illinois.

Power Stations Increase

SAFETY, ECONOMY and CENTRAL CONTROL with GPL CLOSED CIRCUIT TV

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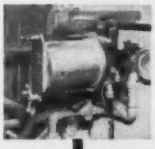
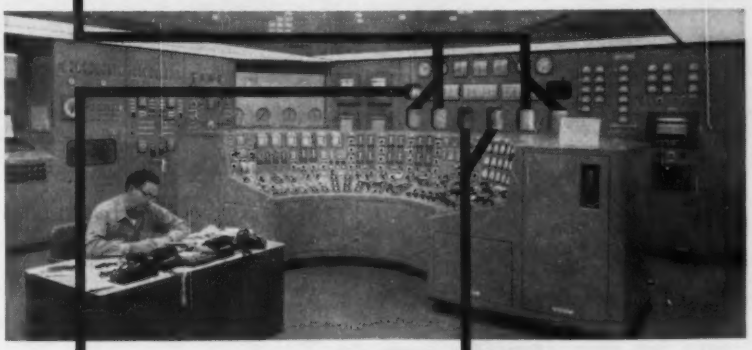
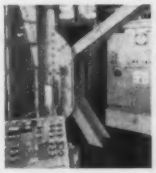


Furnace Observation. A wide-angle view of the inside of a furnace is made possible by a unique new GPL television housing and special lens. Working through a 3" aspirating port, the housing may be inserted or removed conveniently without disturbing furnace operation. Burner lighting and combustion can be observed by control personnel as necessary. GPL systems are available for **all** principal makes of boiler.



Smoke Control. GPL TV permits a convenient check on stacks, enables control room operators to verify that smoke is kept below legal limits and that combustion is most economical.

Gauge Monitoring. Checking on water level in boilers is no problem with GPL TV. A camera in the gauge-glass enclosure at the boiler drum relays the water level picture to the main control room.



Coal Handling. The hoist operator can monitor swing boom and coal moving equipment and coal pile levels in the storage area on pictures relayed to his cab by two outside GPL TV systems.

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US Utilities Adding 13 Million Kw in 1961

A 13-million-kw increase in the nation's generating capacity during 1961, showing the vigor and economic stability of America's power systems, was reported in the Edison Electric Institute's 30th semi-annual electric power survey.

This year's addition to US generating capability represents an increase of 7.5% over the actual capability of 174.9 million kw at the end of 1960. By the end of 1964 total capability is scheduled to reach 221.4 million kw.

The December 1961 peak load for the total electric utility industry is expected to reach 144.1 million kw—an increase in of 8.3% over last year's December peak of 133.0 million kw. By the end of 1964 peak load for the industry is expected to reach 177.4 million kw.

The estimated annual gross margin of power supply over demand indicated for 1961 is 26.4%. By 1964 it is expected that this will be reduced to 19.2%.

Scheduled additions to electric generating capacity from the first of the year through 1965 and later total 51,639,917 kw. Additional units aggregating approximately 2.3 million kw are reported to be on order with the manufacturers, although scheduled dates of operation have not been specifically established.

OUTPUT OF 25 LARGEST COMPANIES OR INTEGRATED SYSTEMS

	Kwhr Output (Including purchased energy and net interchange energy—in thousands)	
	Year 1960	Year 1959
1. Tennessee Valley Authority	63,583,459	61,345,448
2. Bonneville Power Administration	31,295,061	30,759,895
3. American Electric Power Co	29,805,799	28,307,203
4. Pacific Gas & Electric Co	27,008,121	24,708,581
5. Southern Co	25,430,707	23,549,444
6. Commonwealth Edison Co & Subs	24,513,406	23,469,641
7. Consolidated Edison Co of New York, Inc.	20,668,592	19,362,578
8. Southern California Edison Co	19,393,527	17,587,598
9. Niagara Mohawk System	19,339,254	18,897,719
10. Ohio Valley Electric Corp	18,138,607	17,703,807
11. Detroit Edison Co	15,445,068	14,493,079
12. Duke Power Co	14,968,608	13,864,423
13. Philadelphia Electric Co & Subs	13,622,939	13,248,505
14. Public Service Electric & Gas Co	13,356,904	12,727,626
15. Texas Utilities System	12,253,864	11,204,830
16. Middle South Utilities, Inc	11,799,043	11,417,236
17. General Public Utilities	11,046,176	10,484,007
18. Central & Southwest Corp	10,903,950	10,025,560
19. Consumers Power Co	10,617,239	10,040,778
20. Allegheny Power System	10,597,147	10,167,014
21. Houston Lighting & Power Co	9,838,133	8,907,429
22. Union Electric System	9,399,055	9,027,263
23. Virginia Electric & Power Co	9,046,211	8,441,680
24. Ohio Edison Co & Subs	8,369,046	8,032,081
25. Cleveland Electric Illuminating Co	8,054,510	7,897,009

Source: EEI

THE NATION'S 25 LARGEST UTILITIES, according to EEI, all registered significant gains in kwhr output in 1960. First ten (totaled) produced more power than Soviet Union

News Scope

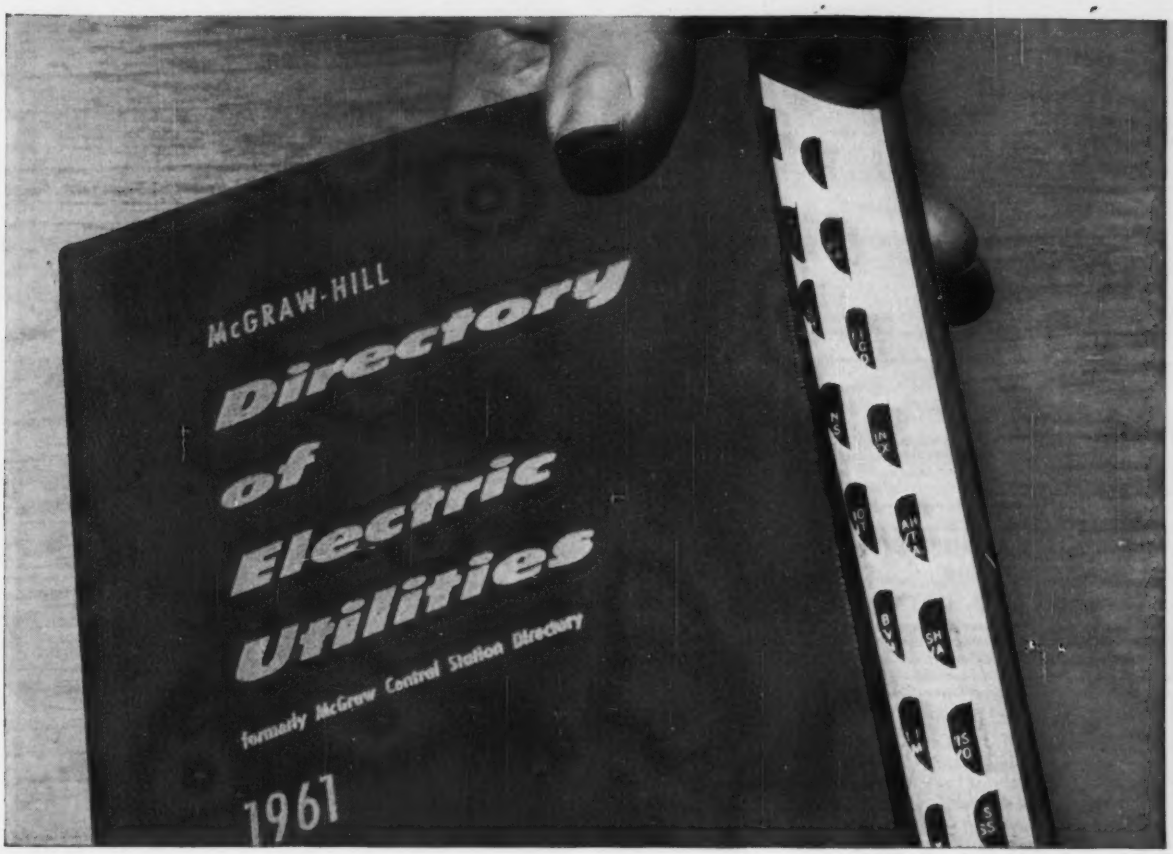
PURCHASE — Allegheny Power System, Inc, will acquire Cumberland Valley Electric Co from Republic Service Corp for 62,589 shares of Allegheny stock. Cumberland serves 6,000 customers in southern Pennsylvania.

NEW EDITION — The Federal Power Commission has issued a 1960 edition of "State Commission Jurisdiction and Regulation of Electric and Gas Utilities," the first edition since 1954. The new edition, including 13 tables, was prepared in conjunction with the National Assn of Railroad and Utilities Commissioners. Copies, at 20¢ each, may be purchased from the Superintendent of Documents, US Government Printing Office, Washington 25, D. C.

DRY SPELL — Persistent dry weather has forced Yugoslavia to shut off hydro power to electrochemical and metallurgical plants and partially to curtail power to other wholesale users. Total reduction in September amounted to 32.8 million kwhr. Reserves and rebuilt large thermal plants kept the cut from being greater.

PUMP - GENERATOR TESTS — Testing of the first 20-Mw unit at New York State Power Authority's Lewiston Pump - Generating Plant has begun. Mechanical tests of the unit, which will operate both as a pump and as a generator, are being conducted with power delivered from the Robert Moses Niagara Power Plant, 4,000 ft away.

GERMAN POWER GAINS—The German Assn of Industrial Power Economy predicts gross power consumption will increase from 109 billion kwhr in 1959 to 220 billion in 1970 and 290 billion in 1975. Generation is expected to rise by 169%, from 106 billion kwhr in 1959 to 286 billion in 1975.



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New, 1961 edition gives 3½ times as many items—in easier-to-find form.

Phone numbers and area codes have been added. New census data. Also new titles including nuclear, manager of rates, of street lighting, of stores, of area development, superintendents, of meters, of substations, of transportation, manager of public relations – and fourteen engineering officials.

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Numbers of residential, industrial, commercial and rural customers; average residential rates and use. Total sales. All new this year.

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Meetings Calendar

NOVEMBER

Tennessee Valley Public Power Association—Annual Open Meeting, Distribution Practices Section, Holiday Inn, Nashville, Tenn., Nov. 5-7; Accounting Section Meeting, Hotel Farragut, Knoxville, Tenn., Nov. 13-14.

American Institute of Electrical Engineers—Western Appliance Technical Conference, Biltmore Hotel, Los Angeles, California, Nov. 6; AIEE-IRE 6th Annual Technical Conference on Non-Linear Magnetics, Statler-Hilton Hotel, Los Angeles, California, Nov. 6-8; Magnetism and Magnetic Materials Conference, Westward Ho Hotel, Phoenix, Nov. 12-16.

Edison Electric Institute—Sales Personnel & Training Committee, New York City, Nov. 6-7; Accident Prevention Committee, Tutwiler Hotel, Birmingham, Alabama, Nov. 6-8; Commercial Cooking & Water Heating Committee, New York City, Nov. 8-9; Area Development Workshop, Miami, Florida, Nov. 14-15; Commercial Lighting Committee, Rochester, New York, Nov. 27-28; Electric Space Heating & Air Conditioning Committee, Pittsburgh, Penn., Nov. 30-Dec. 1.

National Rural Electric Cooperative Association—Region Nine Meeting Sacramento, Calif., Nov. 6-7.

New Jersey Utilities Association—Annual Meeting, Seaview, Country Club, Absecon, Nov. 8-9.

Electric Companies Public Information Program—Third National Youth Conference on the Atom, Palmer House, Chicago, Nov. 9-11.

Air Conditioning & Refrigeration Institute—Annual Meeting, The Homestead, Hot Springs, Va., Nov. 12-15.

Southeastern Electric Exchange—Sales, Advertising & Public Relations Conference, Tides Hotel, St. Petersburg, Florida, Nov. 15-17.

• **American Society of Mechanical Engineers**—Annual Meeting, Statler Hilton Hotel, New York City, Nov. 26-Dec. 1.

• **Pacific Coast Electrical Association**—Administrative Services Section, Hotel Miramar, Santa Barbara, California, Nov. 27-28.

NEMA—Codes & Standard Committee, NEMA Office, New York City, Nov. 9-10; Lighting Equipment Division Meeting, Belmont Plaza Hotel, New York City, Nov. 13-15; Annual Meeting, Plaza Hotel, New York City, Nov. 16; Generation, Transmission & Distribution Equipment Division, Shoreham Hotel, Washington, D. C., Nov. 27-29.

Public Utilities Advertising Association—Region 2 Meeting, Hershey, Penn., Nov. 30-Dec. 1.

DECEMBER

• **Eastern Joint Computer Conference**—Sheraton-Park Hotel, Washington, D. C., Dec. 3-7.

• **Edison Electric Institute**—Residential Electric Heating & Air Conditioning Committee, Chicago, Illinois, Dec. 4-5; Street & Highway Lighting Committee, Tampa, Florida, Dec. 5-7.

• **Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers**—19th Annual Electric Furnace Conference, Penn-Sheraton Hotel, Pittsburgh, Dec. 6-8.

JANUARY—1962

• **Public Utilities Advertising Association**—Region 9 Meeting, Palm Springs, California, Jan. 18-19.

• **American Society of Mechanical Engineers**—Symposium on Thermophysical Properties, Princeton University, Princeton, New Jersey, Jan. 22-26.

• **Southeastern Electric Exchange**—Legal and Claims Committee, Roosevelt Hotel, New Orleans, Louisiana, Jan. 24-25.

• **American Institute of Electrical Engineers**—Winter General Meeting, Statler Hotel, New York City, Jan. 28-Feb. 2.

• Additions this week.

Advertising Index

Allen-Bradley Co. 91
Allis-Chalmers Mfg. Co. 52
American Steel & Wire Div.
United States Steel.....14, 15
Anderson Electric Corp. 29

Babcock & Wilcox Co.....6, 7
Bethlehem Steel Co.....89
Burndy Corp.....2nd Cover

C&D Batteries Div.
Electric Autolite Co. 88
California Federal Savings & Loan
Ass'n. 80
Central Transformer Corp. 4
Chase-Shawmut Co. 101
Chevrolet Div.
General Motors Corp.....24, 25
Combustion Engineering, Inc.....36, 37
Copperweld Steel Co. 18

Directory of Electric Utilities..... 109
Directory of Engineers..... 110
Dodge Div., Chrysler Corp.....46, 47
Dow Corning Corp. 75
du Pont Co.
Polychemicals Dept. 51

Electro-Motive Div.
General Motors Corp.....98, 99
Engineers, Directory of..... 110
Everstick Anchor Co. 80
Exide Industrial Marketing Div.
Electric Storage Battery Co..3rd Cover

Fluor Products Co. 100

G&W Electric Specialty Co. 77
General Electric Co....70, 71, 72, 73, 92
General Precision Inc. 107
Gulf Oil Corp.....26, 27

Indiana Steel & Wire Co., Inc. 106
International Business Machines Corp. 105

Kerrigan Iron Works Co. 38
Kuhlman Electric Co.....4th Cover

Lapp Insulator Co., Inc.....8, 9
Lewis Engineering Co. 104
Line Material Industries.....11, 12, 13

Midwest Piping, Div. Crane Co. 31
Mineralac Electric Co. 106
Minneapolis-Honeywell 78, 79
Moloney Electric Co.....34, 35
Multi-Amp Electronic Corp. 104

National Electrical Contractors Ass'n. 81

Ohio Brass Co. 23
Onan Div., Studebaker-Packard Corp. 28

Reynolds Metals Co. 10

S&C Electric Co.....16, 17
Sangamo Electric Co. 103
Searchlight Section 111
Shell Oil Co. 45
Southern States, Inc.....32, 33
Southwire Co. 97
Sun Oil Co. 30

TRW Computers Co., Div.
Thompson-Ramo-Wooldridge, Inc.. 86

Union Carbide Plastics Co.
Div. Union Carbide Corp. 84

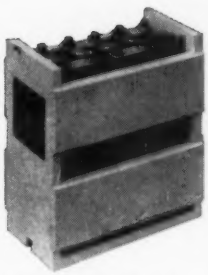
Wagner Electric Corp. 50
Westinghouse Electric Corp...39, 40, 41
42, 43, 44, 48, 49, 83, 85, 87

PROFESSIONAL SERVICES 110

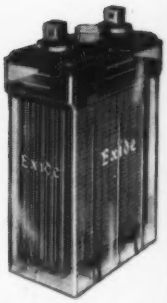
CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 111

EQUIPMENT
(Used or Surplus New)
For Sale 111



Low-maintenance pocket positive nickel-cadmium



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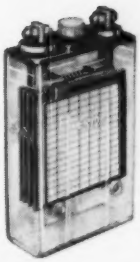
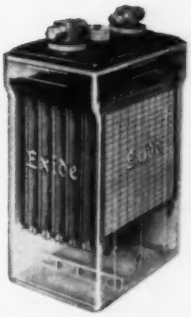
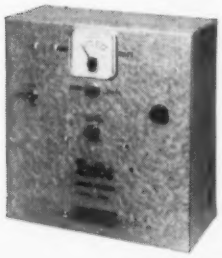


Flat plate Tytex with Silvium or calcium



Long life Exide-Manchex, Planté type, with Silvium



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